A Corporate Land Information Strategic Plan
for the
Government of British Columbia

Volume 1

LAND INFORMATION INFRASTRUCTURE

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LAND INFORMATION INFRASTRUCTURE

Prepared By
DMR Group Inc.

for

LAND INFORMATION STRATEGIC COMMITTEE
and
MINISTRY OF CROWN LANDS

PROVINCE OF BRITISH COLUMBIA

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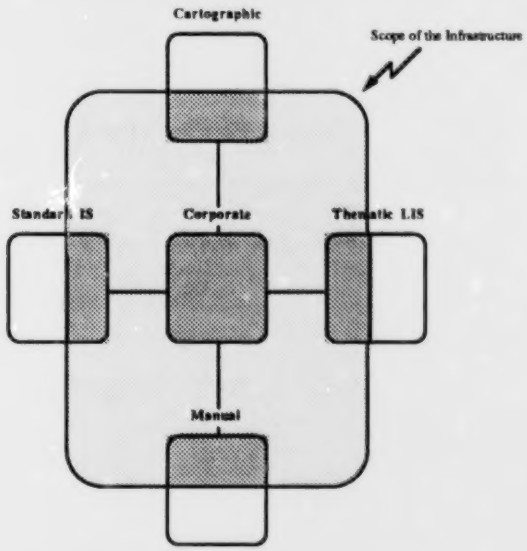
MANAGEMENT SUMMARY

The Ministry of Crown Lands, supported by the Land Information Strategic Committee, has been given the mandate to develop a government-wide strategy covering all government programs involved in the business of mapping and land information management. This report, the first of two from the Corporate Land Information Strategic Plan project, represents the framework for the development of such a government-wide strategy.

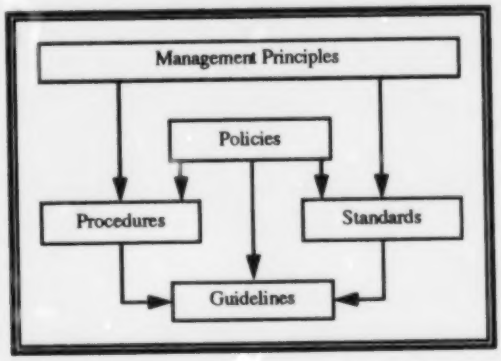
Using the concept of domains of interest in land information, the report lays out a Land Information Infrastructure comprised of the necessary data, applications and technology architectures supporting the government-wide strategy. The central theme of the Infrastructure is that of a "Corporate" domain which services the land information needs of the government as a whole by providing a base for sharing of data within and across four other domains. These domains are best characterized by the type of data managed within each domain:

- Cartographic - Digital data representing baseline descriptions of the land surface and providing a spatial referencing capability to data existing in the other domains.
- Thematic LIS - Digital data tied directly to some spatial context and within the business mandate of a specific line agency.
- Standard IS - Digital data through which a spatial representation of business data is possible, but where such representation is secondary to achieving the mandate of the managing line agency.
- Manual - Non-automated data which would fall into one of the other domains, when automated.



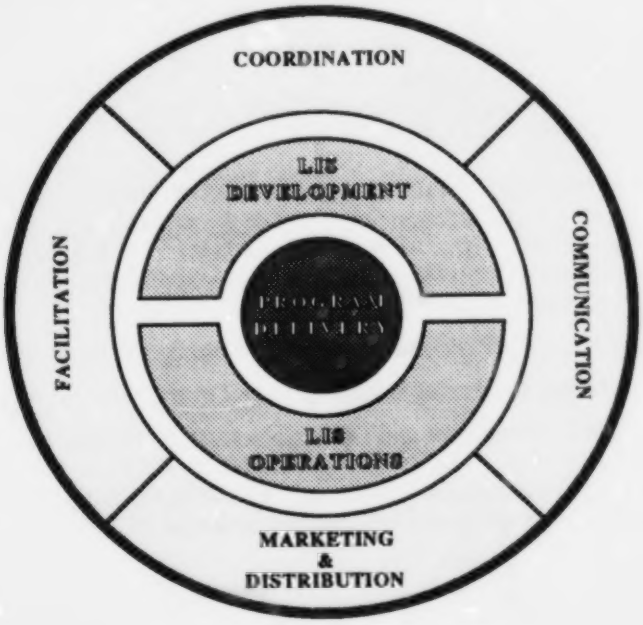
B.C. Land Information Infrastructure

Using these architectures as a foundation, a Land Information Management Framework consistent with the Government of British Columbia Information Management Systems Framework is also described. It seeks to guide the development of policies, procedures, standards and guidelines that support initiatives within the scope of the Infrastructure.



B.C. Land Information Management Framework

Finally an organizational architecture is described that highlights the key functional responsibilities that need to be assumed in support of both the Land Information Infrastructure and the Land Information Management Framework.



Functional Responsibilities supporting the Land Information Infrastructure and the Land Information Management Framework

An analysis of the current position of Provincial Ministries and Crown Agencies reveals that the Government is well positioned to undertake such a strategy, and in fact, is at the forefront among the Canadian Provincial Governments in this area. The major conclusions of this analysis are:

- *Topographic, cadastral and general administrative boundary data form the key foundations for most land-related applications.*
- *There is a strong need and demand for this data managed in a corporate manner.*
- *There is a definite opportunity and need for data sharing and exchange between distinct program areas.*
- *Ministries and Crown Agencies are and will continue to be the source for all land-related data -- their initiatives must continue and must be supported.*
- *There is a need to show governmental direction in the short term.*

Finally, realistic and attainable medium term targets are put forward as the means for focusing future developments. The three central themes of the Land Information Infrastructure, the supporting Land Information Management Framework and the associated functional responsibilities are used as the structural base for these targets. Among the key recommendations within each of these areas are:

- Land Information Infrastructure - Establishment of the Corporate infrastructure necessary for the exchange of land-related data among Government organizations must be the focus in the medium term. A high level conceptual architecture for this effort is described.
- Land Information Management Framework - Policies, procedures, standards and guidelines must be put in place concurrent with the development of the Corporate infrastructure. As a first step, the document puts forward initial managing principles that should be used as the base for this development.
- Functional Responsibilities - With a prime focus on supporting ongoing program delivery within individual Government agencies, most of the responsibility for Corporate functions will fall to Crown Lands with direction and guidance provided by the Land Information Strategic Committee. A consolidated Corporate organization will be established within Crown Lands, consisting of three main groups:
  - Corporate Land Data Resource Management Group
  - Communications, Marketing and Promotion Group
  - Infrastructure Development and Operations Support Group

The migration strategies and action plans necessary for attaining all of these targets will be the topic of the next report from the Corporate Land Information Strategic Plan project.

CHAPTER 1 - PROJECT CONTEXT

PROJECT MANDATE AND APPROACH

The mandate of the Corporate Land Information Strategic Plan (CLISP) project is to:

> *Develop and introduce a strategy for the Government of British Columbia to guide the development of a strategic framework for the management of land information in the Province.*

The attached model represents the approach that has been adopted for developing such a strategy. This document represents the Land Information Infrastructure portion of that overall approach.

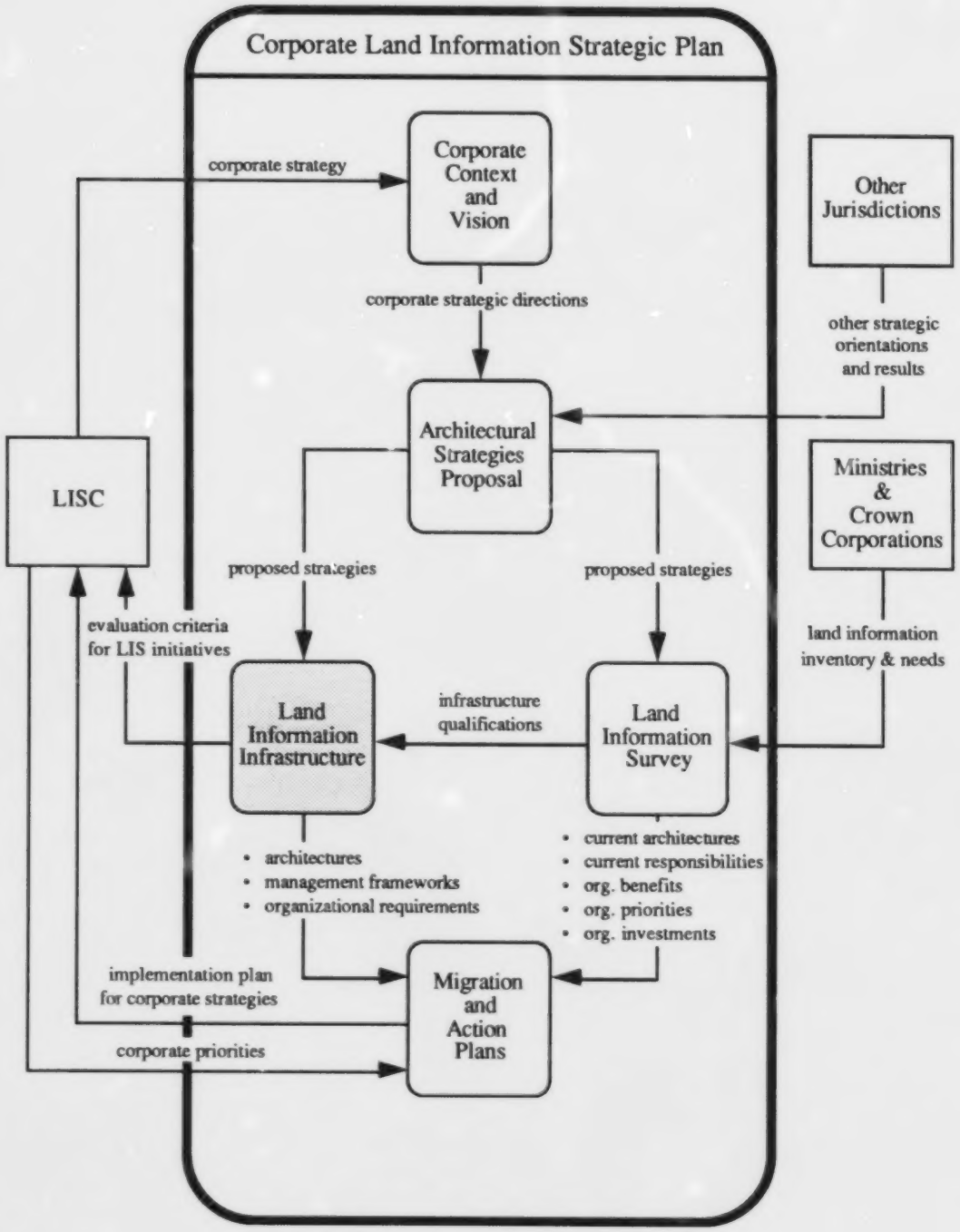
Through the Land Information Strategic Committee (LISC) Coordinating Group, governmental directions in land information and goals driving CLISP have been confirmed and a framework for the creation of a Land Information Infrastructure has been put in place. Also, a survey of British Columbia Government Ministries and Crown Corporations has been conducted as a basis for confirming and refining the Infrastructure.

This fourth phase of CLISP is directed at detailing the Infrastructure to a point where its direction and content are apparent, and thus approvable by LISC, prior to initiating an in-depth action plan for implementation.

GOVERNMENTAL CONTEXT

The Ministry of Crown Lands, supported by LISC, has been given the mandate to develop a government-wide strategy covering all government programs involved in the businesses of mapping or land information management. The specific goals that have been established are:

1. Improve Access to Land Information
2. Facilitate Exchange of Land Information
3. Plan for Future Land Information Needs
4. Pursue Cost-Sharing Opportunities
5. Improve Quality of Land Information
6. Promote Private Sector Involvement
7. Support Marketing of Innovations



Project Context

PROJECT OBJECTIVES

Within the context of the Crown Lands goals outlined above, the specific objectives that have been established for CLISP are to:

1. Specify a corporate land information system infrastructure, within which land related systems can evolve internal to government organizations, that maximizes opportunities for data sharing and exchange between and within these organizations. Specific emphasis should be placed on means for provisioning, and relating corporate digital base maps to, georeferenced land information.
2. Develop a framework within which necessary and beneficial mapping and Land Information System (LIS) standards and conventions can be developed. Specific emphasis should be placed on data exchange standards and communication procedures and methods for access to and distribution of Provincial Government land information.
3. Establish a policy and procedural framework for the management of, and responsibility for, land information programs.
4. Develop the means for LISC to assess the positioning of land information related initiatives within the infrastructure.
5. Assess the positioning of current land related data, applications, technology and organizational responsibilities relative to the infrastructure, and put forward a migration strategy and action plan for the transition from this current position toward the target infrastructure.

This document is intended to address the first four of these objectives and the current assessment portion of the fifth objective.

DOCUMENT STRUCTURE

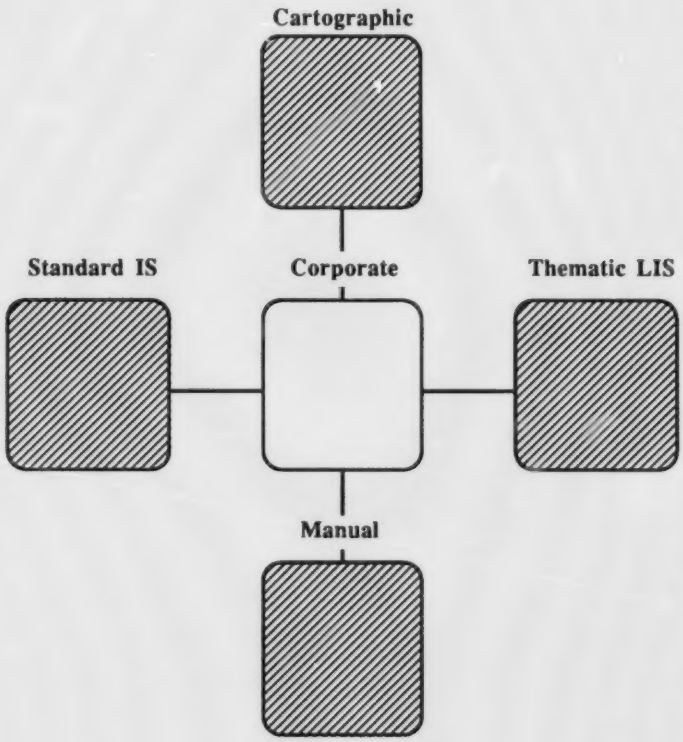
The document is divided into four main parts:

1. **British Columbia Land Information Infrastructure** - Puts forward the key elements of the four architectures that comprise the Infrastructure: the data, applications, technology, and organizational architectures. Also describes a Land Information Management Framework for use in developing and exercising related policies, procedures, standards and guidelines.
2. **Current Situation** - Establishes the current position of existing data, applications, technology and organizations with respect to the Infrastructure, as determined through the Land Information Survey process.
3. **Target Situation** - Puts forward recommended medium term targets for all of the architectures, focussing on the eventual position of specific data and applications within the Infrastructure and recommendations on supporting technology, management principles, organizational responsibilities and implementation strategy.
4. **Reference Material** - Appendices A through E contain various supporting materials used in the development of the Infrastructure.

CHAPTER 2 - B.C. LAND INFORMATION INFRASTRUCTURE

THE BRITISH COLUMBIA MODEL

The governmental goals driving this project, plus examples of similar initiatives in other jurisdictions and trends in the industry, highlight the necessity for a single, unifying concept covering land information needs from the distinct and supporting viewpoints of data, applications, technology, organization and management principles. A model of this unifying concept, the British Columbia Land Information Infrastructure, is shown below.[1]



BRITISH COLUMBIA
Land Information Infrastructure

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[1] Appendix A, "LIS Strategies in Other Jurisdictions", presents an overview of similar initiatives undertaken in Alberta, Quebec, Australia and Switzerland. Appendix B, "Trends in Land Information Systems", presents a summary of key directions in the information technology industry that influence the nature of strategies that can be put forward for British Columbia. Also, a glossary of terms can be found following the appendices (eg. definition of "land information").

Current land-related data and applications, and the technology supporting these data and applications, can be categorized as falling within one of four possible areas of interest, or "domains":

- **Cartographic (or Baseline)** - All digital data which form the background framework pertinent to georeferencing[1] and the applications which support the capture and management of this base data. The central concepts of the Cartographic Domain are:
  - Basic descriptions of the land surface, and
  - Provision of a referencing mechanism as related to other kinds of spatial data.
- **Thematic LIS** - Digital data and related applications that depict aspects of the land and are managed as part of the business mandate of various government line agencies. The Thematic LIS Domain embraces both spatial and related non-spatial data; spatial data in this domain are referenced with respect to the baseline framework provided by the Cartographic Domain. The central concept of this domain is:
  - Data and applications tied directly to some spatial context and within the business mandate of a specific line agency.
- **Standard Information System (Standard IS)** - Digital data and related applications managed as a part of the business mandate of specific government line agencies where the data are primarily non-spatial but where certain data characteristics have the potential to be spatially represented. The central concept of the Standard IS Domain is:
  - Data and applications through which a spatial representation of business data is possible, but where such representation is secondary to achieving the mandate of the managing line agency.
- **Manual** - Any georeferenced or georeferencable data that are managed without the support of automation. (If and when such data are supported automatically, they will be categorized within one of the other domains.)

The unifying concept is a recognition that certain data and applications can, and should, serve the government as a whole. Such data and applications can be classified as falling within the "Corporate" domain, which is focused on provisioning a framework that supports the sharing of data within and across the other four domains. This sharing of data is facilitated by common georeferenced or georeferencable data characteristics across domains.

- **Corporate** - Data or applications, supported through automation, that service the land information needs of the government as a whole in a standard, transparent and convenient manner.

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1 "Georeferencing" is the process of delimiting a given object, either physical (eg. a lake) or conceptual (eg. an administrative region), in terms of its spatial relationship to the land; the geographic reference thus established consists of points, lines, areas or volumes defined in terms of some coordinate system (usually latitude and longitude, or UTM northings and eastings, and elevation). The "background framework pertinent to georeferencing" includes: NTS and BCSG grids, survey control data, place names, planimetry, topography, hydrography, general satellite derived products descriptive of the terrain, and related features.

Scope of the Infrastructure

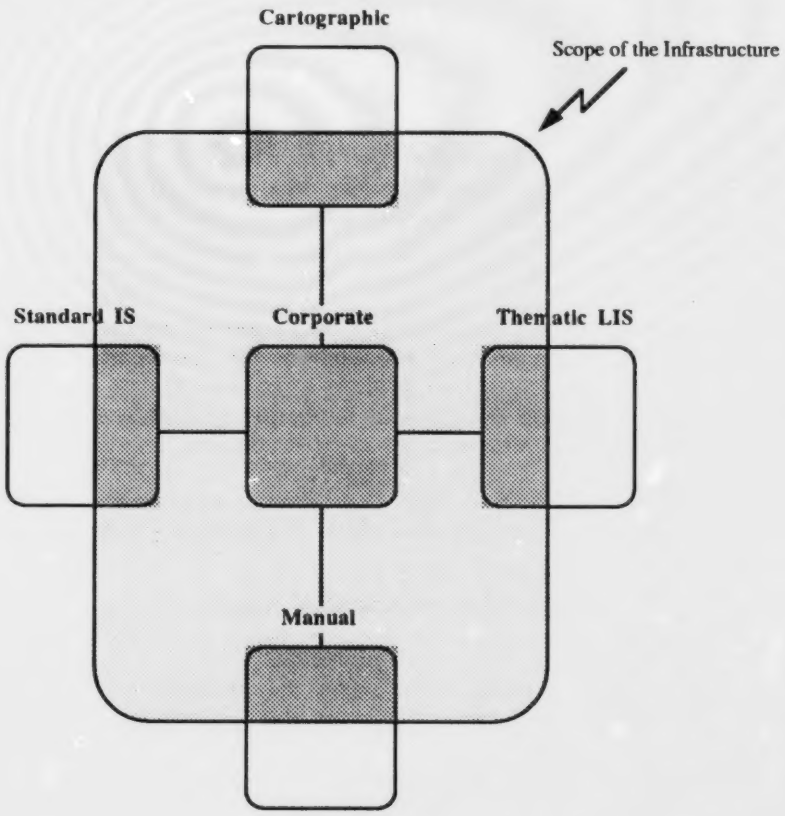
As defined by the Land Information Strategic Committee (LISC), the scope of the Infrastructure includes all land-related data where:

- There is an explicit or implicit need for geo-referencing;

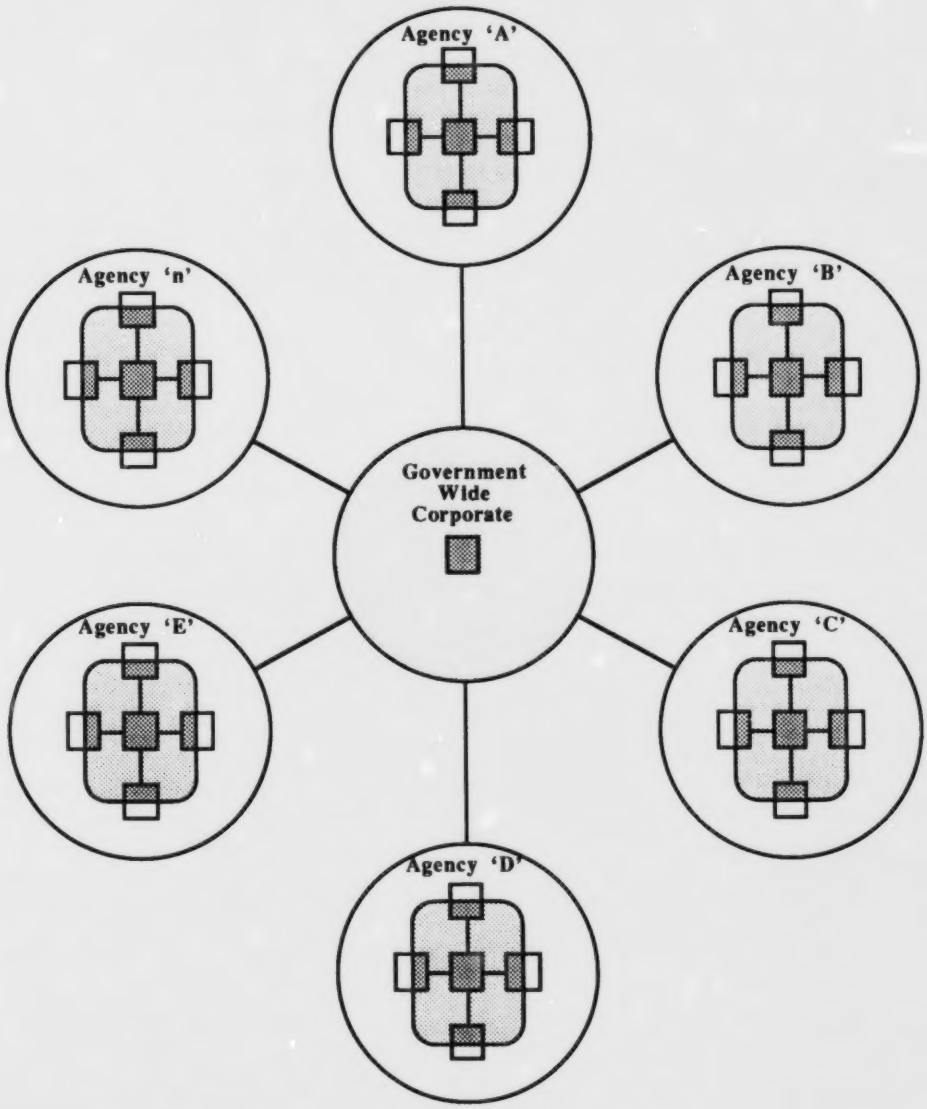
and where one or more of the following criteria are met:

- There is a significant need for the data in other ministries and agencies;
- The data are managed primarily as a service to other agencies;
- The data provide a spatial reference or essential linkage with that of other public or private sector organizations; or
- There is significant commercial market value in the information generated or the technology used.

Relating this to the domains, all data within the Corporate Domain are deemed to be within the scope of the Infrastructure; however, only those portions of the other four Domains that meet the above criteria can be considered to be within scope. This scope is represented below:



From an organizational perspective, the scope of the Infrastructure can be illustrated as below. Each agency can be viewed as participating within each of the five domains. Of specific interest is that, for certain data, individual agencies may be acting in a Corporate capacity. Also, the notion of a Corporate agency exists, where this agency supports the sharing of data across organizations.



Each of the domains represented by the model (Corporate, Cartographic, Thematic LIS, Manual and Standard IS) are now investigated from the points of view of data, applications and technology. This is followed by a discussion of organizational requirements implicit in this structure.

DATA ARCHITECTURE

Data Classification Scheme

In order to develop an infrastructure of all land-related data and support a management framework for the data, a classification scheme that captures the essential distinctions between different types of data is required. Once classified, decisions about data can be made in light of general principles applicable to specific classifications.

The focus of the classification scheme presented here is that of the "data group" and the "data entity". A data group is any set of data used to characterize a specific subject, topic or theme. Examples of data groups include:

- The set of data characterizing forest cover
- The set of data surrounding the digital mapping georeference base
- The set of data about water licensing
- The set of data supporting land assessments

A data entity is a uniform subclass of data within a data group. More formally, a data entity is a class of people, places, things, events or concepts about which data are collected and individual occurrences of which are uniquely distinguishable from other occurrences. Examples of data entities include:

- Forest cover polygons
- 1:20,000 scale digital map sheets
- Water license sites and water license holders
- Land titles

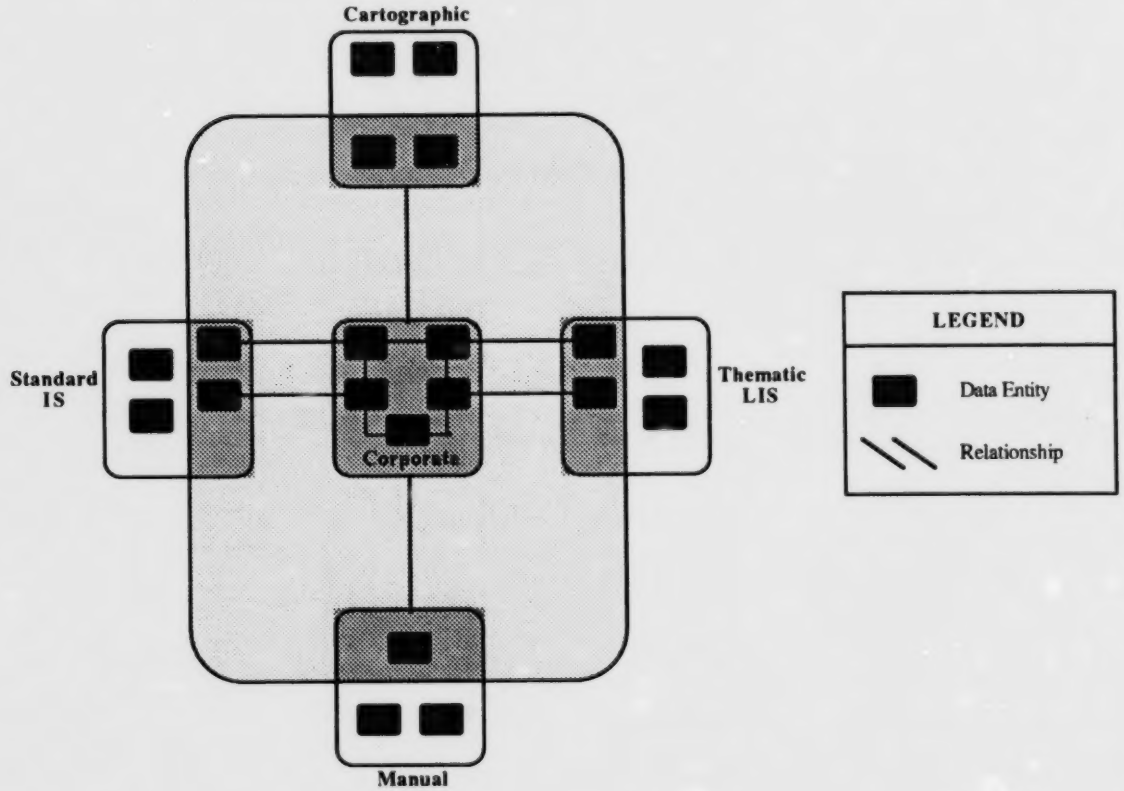
The framework of this data classification scheme is based on two factors:

1. **Domain of Interest** - The domains presented in the Infrastructure form the primary framework for the classification of data groups and data entities.
2. **Topical Data Class** - The ends to which specific data are captured and applied form a secondary classification of data groups and data entities. Five such classes have been identified:
   a) Topographic (Baseline) Data - Data that characterize the land itself and that form the essential linkage to other land-related data.
   b) Legal and Administrative Boundary Data - Data that describe the legal or administrative jurisdictional limits associated with the land.
   c) Resource and Environmental Data - Data about the biophysical characteristics of the land.
   d) Infrastructure (Facilities) Data - Data collected about services provisioned on the land, as in the specifications associated with roads, utilities, buildings, and railways.
   e) Socio-Economic Data - Data collected about social or economic activities associated with the land, such as data about land use, demographics and personal or corporate taxation.

Data Model

The diagram below represents the shell of the data architecture within the context of the Land Information Infrastructure. As can be seen,

- Data entities reside wholly within a specific domain (data groups, on the other hand, may span multiple domains);
- Certain data entities are beyond the scope of the Infrastructure, even though they may be classified as falling within a specific domain;
- The only relationships within the scope of the Infrastructure are those that are supported through the Corporate Domain (relationships between entities within the other four domains are beyond the scope of the Infrastructure);
- Relationships between Corporate data entities and Standard IS or Thematic LIS data entities are specific whereas those with Cartographic and Manual data entities are more generalized. That is, the georeferencing capability of data within the Standard IS and Thematic LIS Domains is derived from common spatial characteristics in the Corporate domain. Data in the Cartographic and Manual Domains are not dependent on these characteristics (in fact, the characteristics are drawn from the Cartographic Domain).



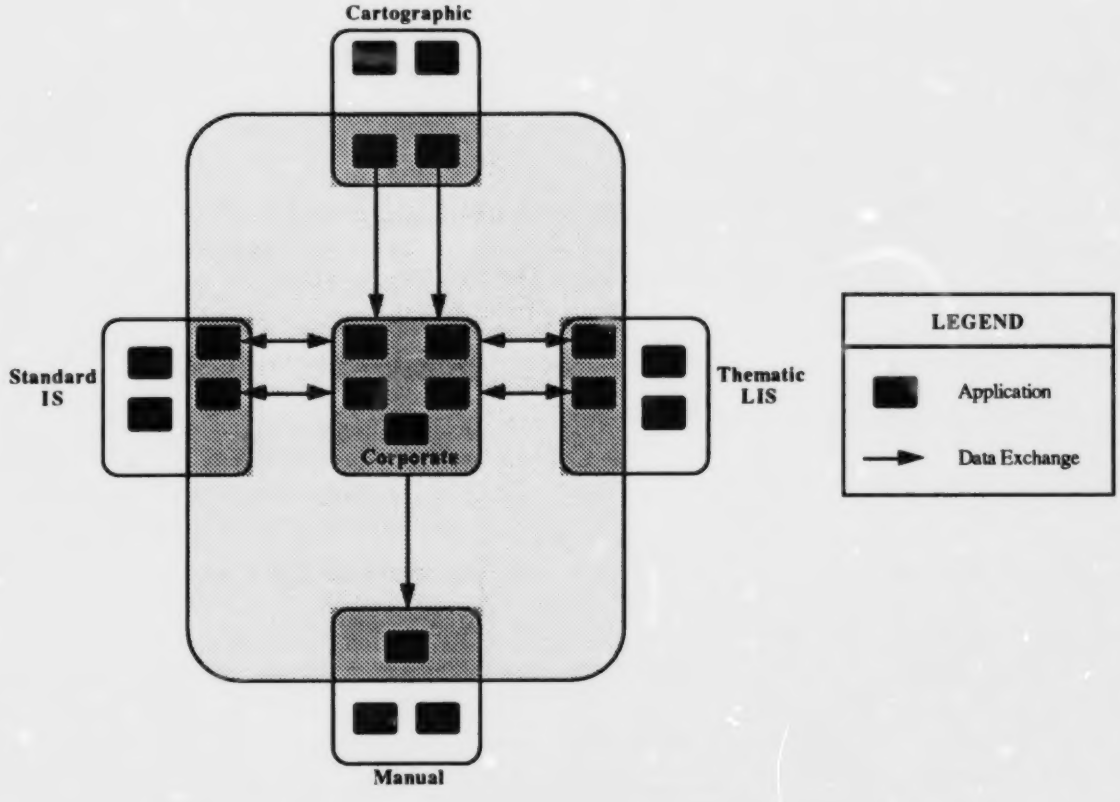
APPLICATIONS ARCHITECTURE

Applications Classification Scheme

As with data, applications are classified according to both their Domain of Interest and their Topical Class. The rationale for adopting a classification scheme identical to that for data is that the essential focus of the Infrastructure is on facilitating the sharing of land-related data resources and not on the sharing of application functionality (although a few Corporate applications will exist to address common functional needs). Within the context of the Infrastructure most applications should be viewed as data management applications, since it is only the data management portion of any application that is of interest in the sharing of land-related data resources.

Applications Model

The diagram below represents the shell of the applications architecture within the context of the Land Information Infrastructure. As can be seen, applications reside wholly within a specific domain; data exchanges between applications that are within the context of the Infrastructure are those facilitated through the corporate domain. The implication of this model is that any application that is deemed to be within the bounds of the Infrastructure must have appropriate functionality to support the exchange of land-related data. Also note that data exchange between corporate applications does not occur; instead, they all act on a common pool of land-related data.



B.C. Land Information Infrastructure

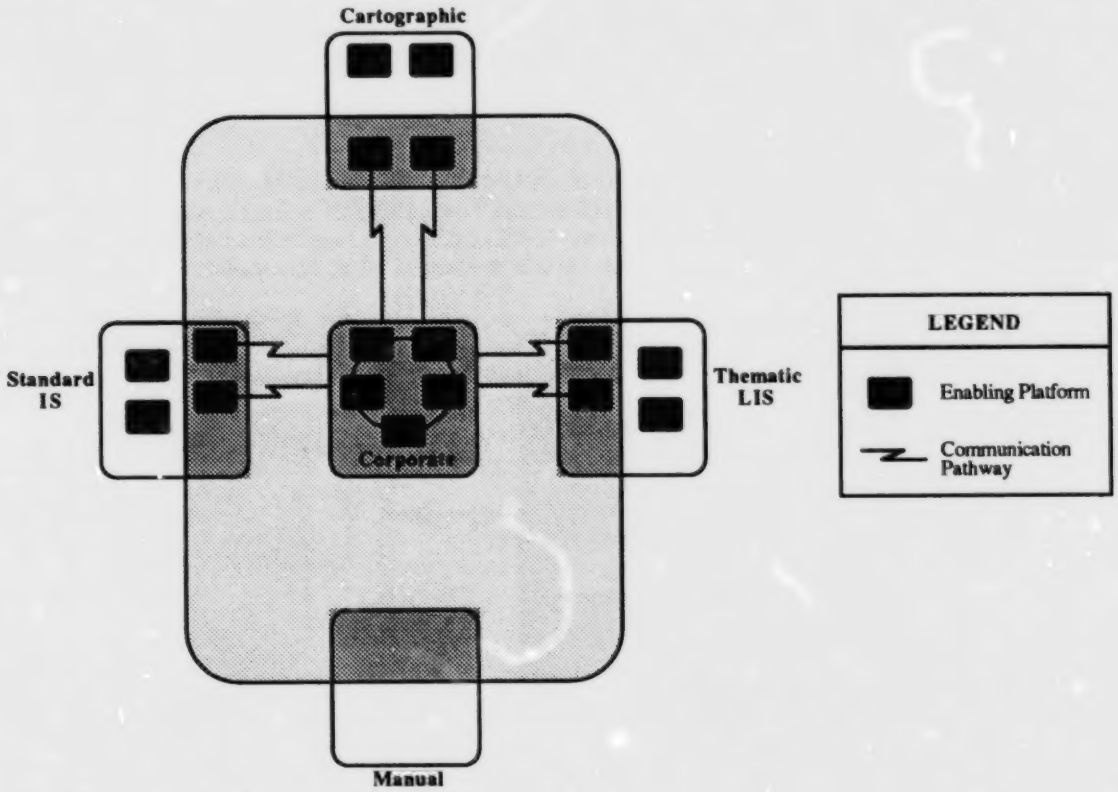
TECHNOLOGY ARCHITECTURE

Technology Classification Scheme

Unlike the data and application architectures, there is no classification scheme for technology in its own right. Rather, specific uses of technology are viewed as components of the enabling platform that support specific data and applications.

Technology Model

Using the concept of the enabling platform from above, the diagram below represents the shell of the technology architecture within the context of the Land Information Infrastructure. The immediate implications of this model are that communication paths (eg. networks, tape transfers) will have to be provided in support of data access and exchange between applications, and that there will be a transparency or seamlessness of platforms within the Corporate Domain.



LAND INFORMATION MANAGEMENT FRAMEWORK

Overview

The use of the Infrastructure and its subordinate data, applications and technology architectures in the realization of corporate goals will be governed using a base set of management principles. These principles, in turn, will form the basis for development of supporting policies, procedures, standards and guidelines. This collection of principles, policies, procedures, standards and guidelines form the Land Information Management Framework (see diagram below).

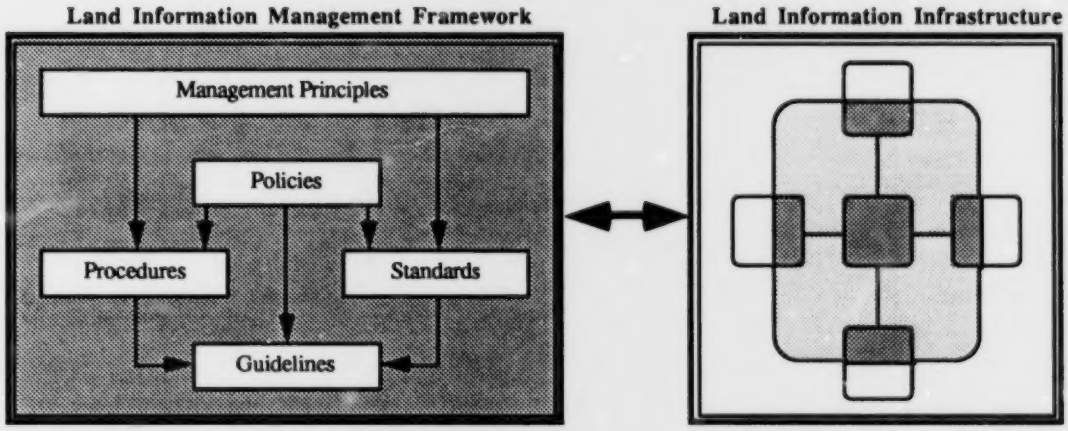
The remainder of this section of document establishes a shell for the development of the Land Information Management Framework. It includes:

1. **Scope of the Management Framework** - describing the extent of the Management Framework.

2. **Use of the Management Framework** - describing the application of the Management Framework to specific LIS initiatives.

3. **Management Principles** - outlining the type of principles that must be adopted, including certain specific principles, where appropriate.

Also included, in Chapter 4, is an initial version of specific principles from which specific policies, procedures, standards and guidelines can evolve.



Scope of the Management Framework

Within the context of the Infrastructure, the management principles outlined in this section will be applied with varying degrees of rigor, depending primarily on the domain classification of the data and applications involved or the enabling technology platform surrounding these data and applications. Similarly, certain principles will only be relevant to certain domains. As a general rule, there will be three classifications of data and applications that establish the applicable principles; these classifications are drawn from the diagram representing the scope of the Infrastructure (on page 6 of this document):

- **Class 1 Standardization (Corporate)** - Data and applications within the Corporate Domain will be subject to the highest degree of standardization;
- **Class 2 Standardization (Non-Corporate, In-Scope)** - Those outside the Corporate Domain but still within the scope of the Infrastructure will be subject to the principles that have been established for the domain to which the data or applications have been assigned; Class 1 standardization should be encouraged, but will not be mandatory; and
- **Class 3 Standardization (Out of Scope)** - Those beyond the scope of the Infrastructure will be outside the scope of the Management Framework, but again, adoption of key principles will be encouraged as a means for ensuring that data and applications encompassed by future expansions in the scope of the Infrastructure are readily accommodated.

The Land Information Management Framework is intended as a supplement to, rather than a replacement of, the existing Information Systems Management Framework, but with a specific focus on land-related information systems. The principles outlined within the Land Information Management Framework will be but a portion of the total set of principles that may apply to a given initiative.

From an organizational standpoint, the Management Framework will apply to all ministries, offices and appropriations of the Government of British Columbia where there is an involvement with land-related information. Crown Corporations or Commissions and Regional or Municipal Governments, although beyond the scope of this framework, will be encouraged to participate and adopt the framework, both as a benefit to themselves and the Government as a whole.

Use of the Management Framework

As is readily apparent from the discussion above, the classification of specific data and applications is central to the use of the Management Framework. The criteria that should be applied in establishing this classification are:

1. Do any of the criteria defined by LISC (as listed on page 6 of this document) apply? If so, the data and the application managing that data are within the scope of the Infrastructure and therefore subject to the Management Framework. Note that there may be a refinement of these criteria over time, in response to changes in the role or focus of LISC.
2. Do the data provide basic descriptions of the land surface or provision a referencing capability for other kinds of spatial data? Such data and their associated applications may be either Cartographic or Corporate.
3. Are the data managed in response to the fulfillment of specific agency business mandates? These data and their supporting application are most likely either Standard IS or Thematic LIS, although a Corporate classification is still possible.
4. Is there a direct and tight correspondence between the data and specific business or baseline definitions of the land? This tends to indicate a Thematic LIS classification, although a Corporate classification may still be likely. Or is the spatial relationship more tenuous and not germane to the achievement of business objectives? If so, a Standard IS classification is more appropriate.
5. Are the data:
    a) Managed primarily as a service to other agencies?
    b) Essential or strategic to the mandates of other agencies?
    c) Already classified as Corporate within the target Infrastructure (as initially defined by this document in the Chapter titled "Target Situation")?

    All of these suggest that the data should be classified as Corporate.

It should also be highlighted that where specific data are deemed to be Corporate, the applications managing that data must be considered Corporate. If organizations are to rely on and place their trust in Corporate data, they must be assured that the applications responsible for managing this data are doing so from a government-wide perspective and not just for a local, program-specific need. The immediate implication of this statement is that where an application is directed solely at supporting specific program mandates, but where the data captured as a by-product of this functionality is of Corporate value, a replication of the data management functionality may be required in the Corporate Domain. This is due to the fact that the higher degree of control required in the Corporate Domain may actually impede the achievement of specific program mandates (eg. changes to Corporate data will have to be communicated to, and perhaps ratified by, all affected parties prior to the update of that data).

Management Principles

Using the framework provided by the Information Systems Management Framework, policies, procedures, standards and guidelines are required in the areas of:

- Planning
- Approvals
- Procurement
- Data Resource Management
- Development
- Operations
- Security
- Evaluation
- Technology

Within this framework, the specific extensions that will be required to incorporate land-related initiatives are detailed below.

Planning

No extensions will be required.

Approvals

Extensions will be required for:

- **LIS Project Evaluation** - covering the criteria applicable to the evaluation of Ministerial LIS initiatives, as currently performed by LISC.

Procurement

No extensions will be required.

Data Resource Management

Extensions will be required in the areas of:

- **Data Definition** - The need for sharing of land information implies the need for a common understanding and representation of the shared data. Specifically, data definition standards must address:
  - Common Identification and Terminology
  - Common Classification
  - Common Meaning
  - Common Object Representation

- **Data Inventory** - Data that are actually stored and that are deemed to be useable and significant for the purposes of inter-organization data sharing need to be identified in the form of an inventory, with the inventory itself accessible to any organization that has a need for shared land data resources. This inventory should be comprised of two parts:
  - Technical Specifications - describing the nature of stored data in terms of content, coverage, format, structure and quality (ie. precision, timeliness, original source).
  - Access Specifications - describing the methods and requirements surrounding access to stored data, including such things as responsibility, availability and cost.
- **Data Exchange Specifications** - Covering the transfer of data within and between data domains and transfers to or from data domains with sources external to the government.
- **Data Archive Specifications** - Covering the archive of Corporate, georeferenced spatial and textual digital data in a common format across all parts of the Government of British Columbia.
- **Data Administration** - Covering the maintenance and evolution of a Corporate data dictionary and data inventory.

Development

LIS specific development standards, policies, procedures and guidelines will be necessary for:

- **LIS Project Development** - Covering the procedures necessary for initiating, specifying, developing and implementing LIS projects within the framework of the Land Information Infrastructure.
- **Applications Development Framework** - One of the fundamental principles driving applications in the Corporate Domain will be the need for transparency of application boundaries. In order to realize this principle, a Corporate LIS Development Framework will be required, including:
  - A development methodology covering any development initiatives in the Corporate Domain, and
  - A standard user interface for all Corporate applications, where the interface encompasses varying display technologies.
- **Corporate Applications Inventory** - A directory and definition of all applications in the Corporate Domain will be required in support of the use of those applications across government.

Operations

Additional policies and procedures will be required for:

- **Data Creation and Update** - covering responsibilities for collecting, managing and modifying land-related data.
- **Data Provisioning** - covering responsibilities for providing updated versions of specific land-related data and for marketing this same data, either in the public or private sector.

Security

Additional security-related policies and procedures will be necessary in the area of:

- **Data Access** - covering the retrieval and use of land-related data.

Evaluation

Distinct evaluation policies and procedures will be required for:

- **LIS Project Post-Implementation Reviews** - Covering the process of assessing completed Corporate projects in light of the initial scope, objectives, success factors and estimates established for the project.

Technology

The key technology-related guiding principles are:

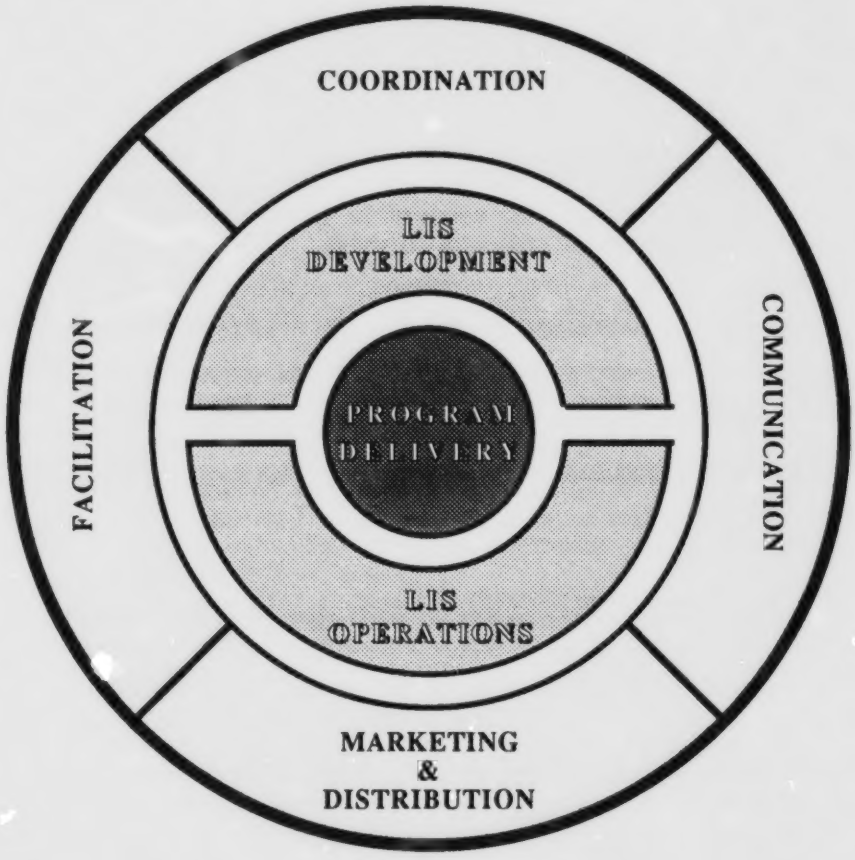
- The technology architecture must support the geographically dispersed computing environment of the Government of British Columbia.
- A multi-vendor computing environment must continue to be supported.
- The technology architecture must support distribution of large volumes of data.
- Technology within the Corporate Domain must be seamless (transparent).
- All Corporate applications will require online access to Corporate data.

From these arises the need for standards, specific to the land-related systems arena, covering:

- Networking Capabilities
- Workstation Capabilities
- Database Management System (DBMS) Packages
- Geographic Information System (GIS) Packages (primarily the data management component of the GIS package)

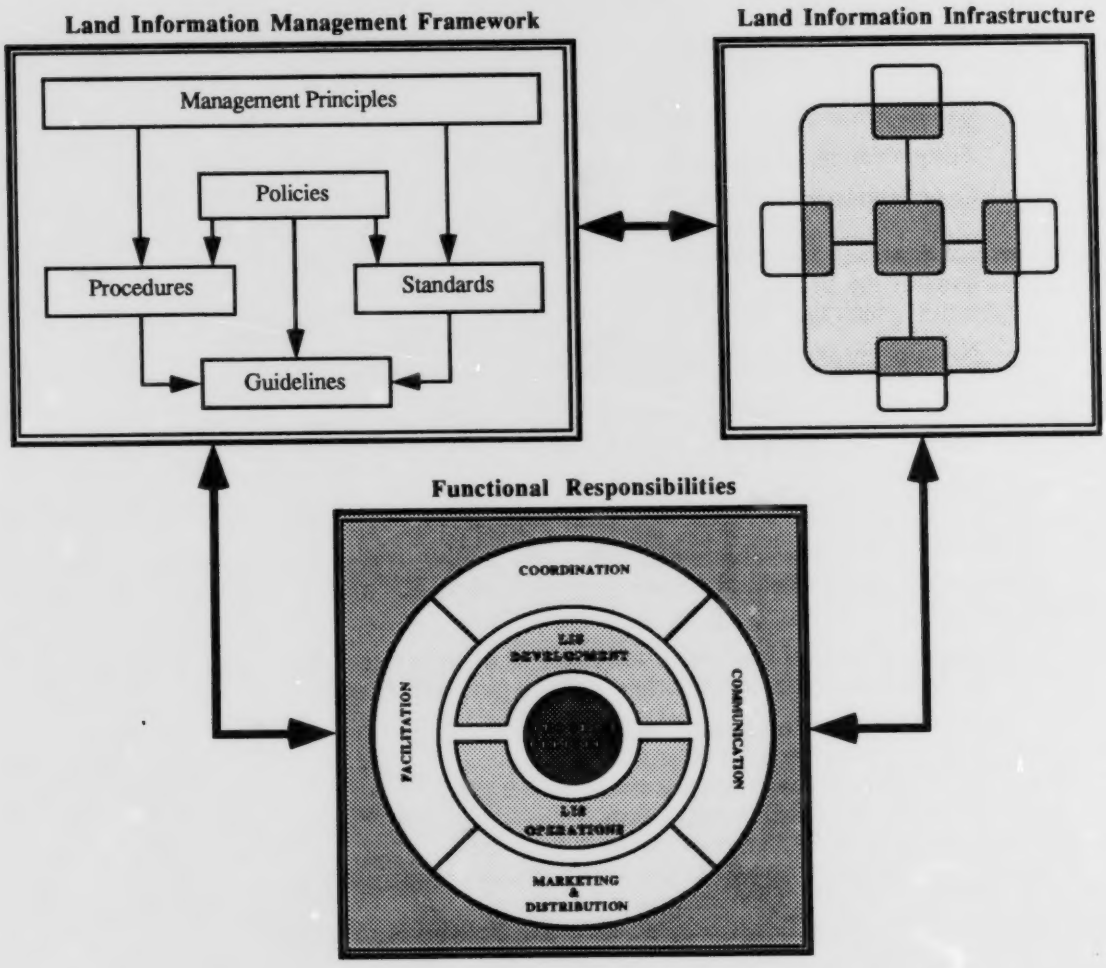
ORGANIZATIONAL ARCHITECTURE

The responsibilities that need to be assumed in support of the Infrastructure and the Management Framework fall into several functional areas, as illustrated below. The central and primary thrust remains with the base governmental mandate of program delivery, supported through LIS development and operations, and enhanced and integrated as a service for the government as a whole through the responsibilities of coordination, communication, facilitation and marketing and distribution.



FUNCTIONAL RESPONSIBILITIES
supporting the Land Information Infrastructure
and the Land Information Management Framework

The integration of functional responsibilities with the Infrastructure and the Management Framework can be represented as follows:



Responsibilities supporting the Management Framework are in the areas of definition, modification, and control of policies, procedures, standards and guidelines. Responsibilities related to the Infrastructure are in the areas of support, development and operations.

In more detail, the functional responsibilities are:

- **Coordination** - all means used to organize, involve and manage the joint activities of varied groups with an interest in the development of land information systems. These groups may include the public sector, the private sector, the educational sector, industry and professional associations, and the general public. The focus of the coordinating function is on providing an institutional basis for achieving consensus and common direction among these communities of interest. Some specific responsibilities include:
  - Evaluation of ministerial LIS initiatives
  - Assignment of land-related data collection priorities
  - Coordination of land information mapping research and development
- **Communication** - all means used to inform the immediate and broader community of the objectives of the coordinating organization and its activities and to obtain and provide information which facilitates the achievement of coordination goals. Mechanisms include:
  - Newsletters and other publications
  - Conference participation
  - Membership in and relationships with other associations and organizations
  - General meetings
  - User surveys
- **Facilitation** - all means used to achieve desired results more effectively, through such actions as:
  - Development of policies, standards and procedures for land-related data and applications and their supporting technologies, including:
    - Data Dictionary and Data Definition Standards
    - Data Inventory Standards
    - Data Exchange Specifications
    - Data Archival Specifications
    - Corporate LIS Development Guidelines
    - Corporate Standard User Interface Guidelines
    - LIS Project Development Procedures
    - Corporate Telecommunications and Networking Standards
    - Corporate Database Management System Standards
    - Corporate GIS Package Standards (primarily related to data management)
  - Development and maintenance of strategic plans, covering:
    - Privatization
    - Marketing and Promotion
    - Information Pricing and Costing
    - LIS Development
  - Technology research and development
  - Training and education
  - Project funding

- **Marketing and Distribution** - all means used to:
  - Identify the potential market for land-related products and services, and
  - Distribute or deliver such products and services in response to market demands.
- **Program Delivery** - all means for achieving mandates and objectives in mapping or land information management programs, including:
  - Data creation and update
  - Data access
  - Data provisioning
  - Data administration
- **LIS Development** - all activities related to the development of land information systems, including:
  - Development of project plans
  - Acquisition of project resources and establishment of development environment
  - Project execution
  - Project management
  - Project termination
- **LIS Operations** - all activities related to operations of land information systems, including the day-to-day coordination of using shared land-related information.

CHAPTER 3 - CURRENT SITUATION

INTRODUCTION

In order to understand current positions and directions, and as a means for qualifying and orienting the Infrastructure itself, a Land Information Survey was conducted as a part of this project. For the most part, the findings presented in this chapter reflect those arising from the survey.

In all, thirty-one Ministries and Crown Corporations were asked to participate in the survey. Of these,

- Three chose to opt out of the survey.
- Nineteen provided detailed responses.
- Five provided high level responses, opting to forward alternate material for analysis or only certain key portions of the survey. Although these responses could not be used for analysis of individual survey questions they have been considered in more general assessments.
- Four did not respond or did not respond in time to be considered within the analysis.

A list of the organizations that were asked to participate in the survey is provided in Appendix F.

The analysis of survey results, and other findings established during the course of the project, are presented in the following sections from the points of view of data, applications, technology and organization.

DATA ARCHITECTURE

Data Classification

Although the core of the data classification scheme is at the level of data entities, this project sought only to classify data groups within the Infrastructure domains. The rationale for this approach is that, at this point in the development of the Infrastructure, qualification and confirmation of the Infrastructure are much more relevant to establishing the long term direction of the Government of British Columbia than a detailed examination and classification of specific data requirements. Such requirements will ultimately be pursued within the context of the Infrastructure laid down in this document.

The Land Information Survey uncovered approximately 50 distinct land-related data groups in use within the Government of British Columbia. Each of these have been assessed and a domain classification that best reflects the current classification of subordinate entities has been assigned. This detailed classification can be found in Appendix C - Data Dictionary. These classifications are by no means final and absolute, however, certain general conclusions can be drawn.

As a summary, mapping the topical data classes and certain key data groups onto the Infrastructure domains reveals the method in which specific types of data are currently managed:

- **Cartographic** - Topographic data (primarily planimetric), cadastral data and data representing general administrative boundaries are managed in support of common georeferencing needs.
- **Thematic LIS** - Resource data, infrastructure (facilities) data and specific administrative boundaries are managed in accordance with their position on the land (ie. through georeferenced data characteristics).
- **Standard IS** - Various titles, assessments, and demographic data are managed using standard IS techniques with only a casual relationship to the land (ie. through potentially georeferencable data characteristics).
- **Manual** - A portion of all data classes are still managed through purely manual means.
- **Corporate** - No data classes can be viewed as being managed in a corporate manner.

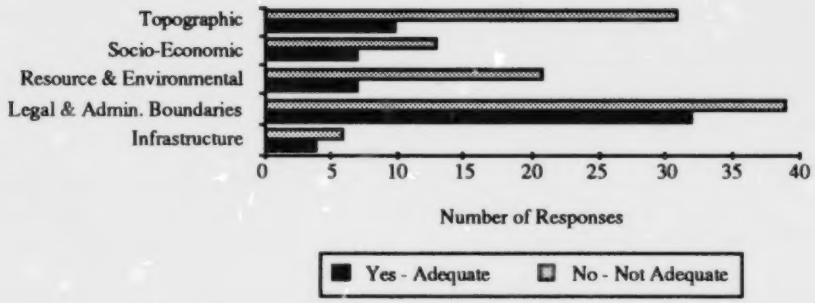
Current Situation

Data Assessment

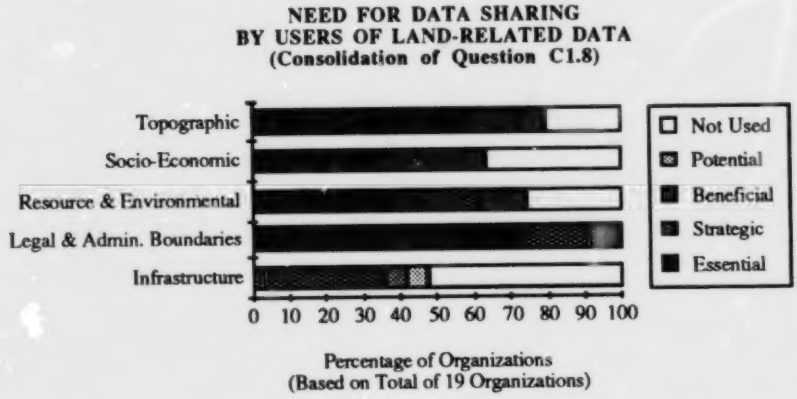
The Land Information Survey has provided several indicators of the appropriateness of land-related data. A summary of the findings from the survey is presented below; specific shortcomings for specific data groups have been documented and can be found in Appendix C - Data Dictionary.

- **Adequacy of Data** - On average, about 65% of all respondents indicated that the data currently available for addressing program requirements were inadequate. Among the primary concerns expressed were the lack of data in digital form and the incomplete coverage of both digital and manual data.

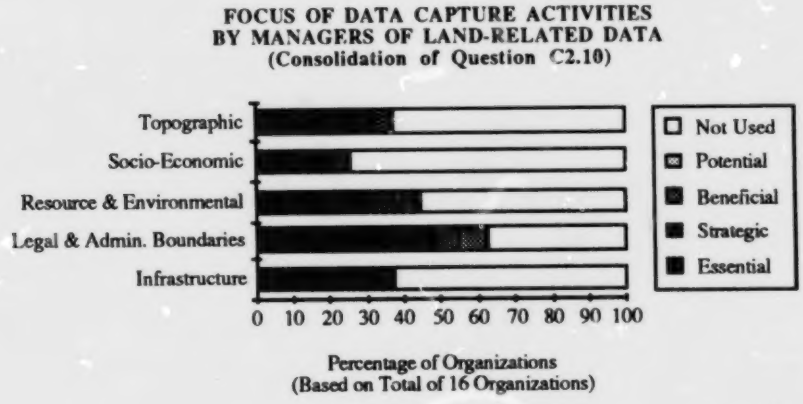
ADEQUACY OF DATA AS VIEWED BY USERS OF LAND-RELATED DATA (Consolidation of Question C-1.7)



- **Popularity of Data** - In total, about 90% of respondents indicated a need for topographic data, cadastral data and data describing basic administrative boundaries; in addition, over 80% of all respondents indicated that such data was either essential or strategic to meeting program objectives.

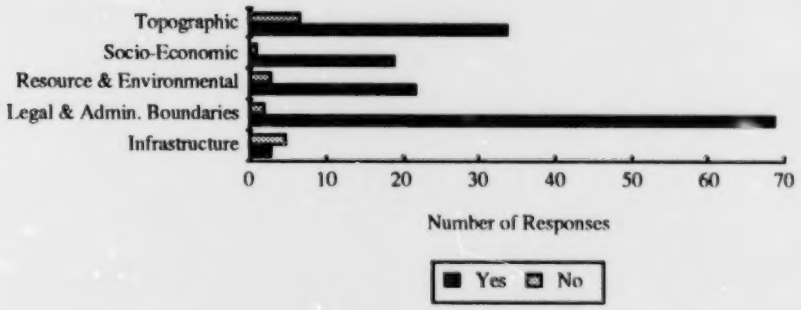


- **Focus of Data Management Activities** - In general, the focus of data management activities of Ministries and Crown Corporations is on the data that are considered either essential or strategic to the achievement of program objectives. One conjecture that can be made (based on this and the previous observation) is that the difficulties in obtaining data that may be beneficial override the level of benefit involved. The potential uses of data peripheral to the scope of program mandates can only be realized when such data are readily available.

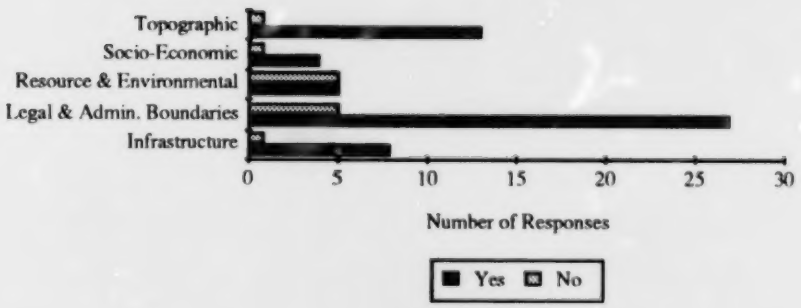


- **Government-Wide Value of Data** - Over 90% of all respondents indicated that land-related data, regardless of the type of data involved or the group managing that data, were considered to be of government-wide value.

DATA CONSIDERED TO BE OF GOVERNMENT-WIDE VALUE BY USERS OF LAND-RELATED DATA
(Consolidation of Question C-1.9)

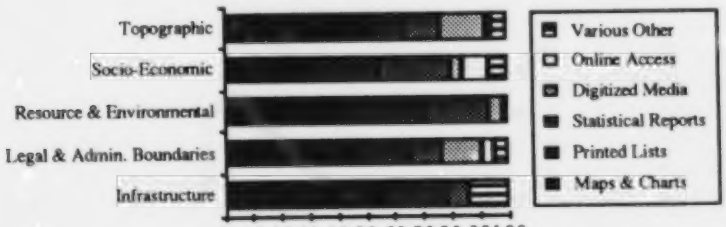


DATA CONSIDERED TO BE OF GOVERNMENT-WIDE VALUE BY MANAGERS OF LAND-RELATED DATA
(Consolidation of Question C-2.11)



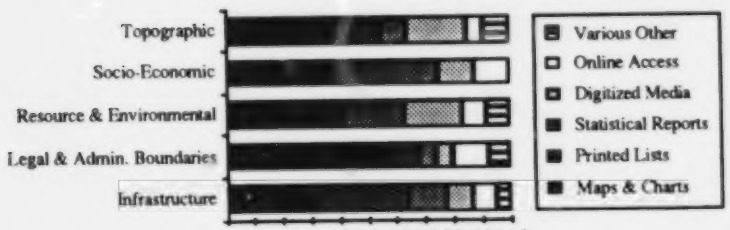
- **Data Medium** - About 80% of all land-related data needs are currently addressed through manual media such as maps, charts, printed lists and statistical reports with 20% supported in digital or online form. However, over 80% also indicated that they require the data in digital form with only 20% indicating that manual media were appropriate.

DATA USAGE MEDIUM REPORTED BY USERS OF LAND-RELATED DATA (Consolidation of Question C-1.3)



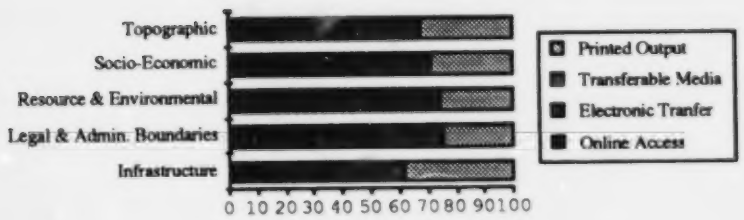
Percentage of Responses by Class
(where one response = one reported usage media for one organization using one data group)

DATA DISTRIBUTION MEDIUM REPORTED BY MANAGERS OF LAND-RELATED DATA (Consolidation of Question C-2.9)



Percentage of Responses by Class
(where one response = one reported usage media for one organization and one data group)

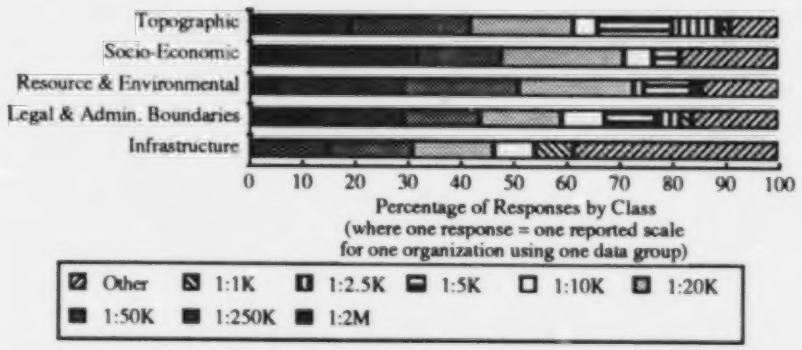
DATA ACCESS NEEDS REPORTED BY USERS OF LAND-RELATED DATA (Consolidation of Question C-1.10)



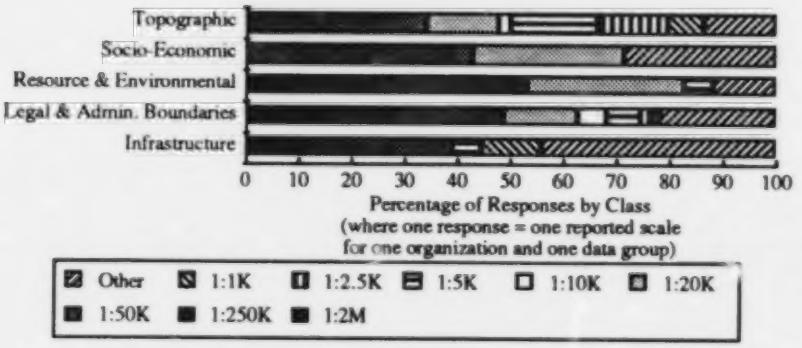
Percentage of Responses by Class
(where one response = one reported access need for one organization using one data group)

- **Data Scale** - A large percentage of all land-related data are required at scales from 1:20,000 through 1:2,000,000; however, in the areas of legal and administrative boundaries and topographic data, there is a significant requirement for larger scales, primarily in the range of 1:2,500 through 1:10,000. The implications of this in combination with the general need for digital data, specifically in the area of topographic data, are that current initiatives such as TRIM (1:20,000 digital mapping) although addressing most of the need for topographic data will not support the total need for topographic data.

DATA SCALE NEEDS
REPORTED BY USERS OF LAND-RELATED DATA
(Consolidation of Question C-1.4)

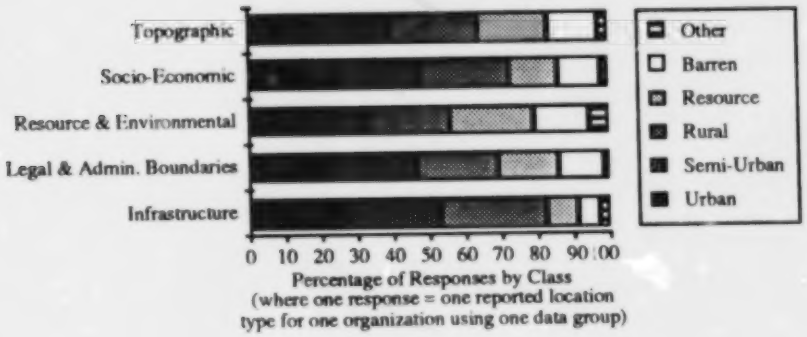

Topographic
Socio-Economic
Resource & Environmental
Legal & Admin. Boundaries
Infrastructure
0 10 20 30 40 50 60 70 80 90 100
Percentage of Responses by Class
(where one response = one reported scale
for one organization using one data group)
Other 1:1K 1:2.5K 1:5K 1:10K 1:20K
1:50K 1:250K 1:2M

DATA SCALE NEEDS
REPORTED BY MANAGERS OF LAND-RELATED DATA
(Consolidation of Question C-2.4)

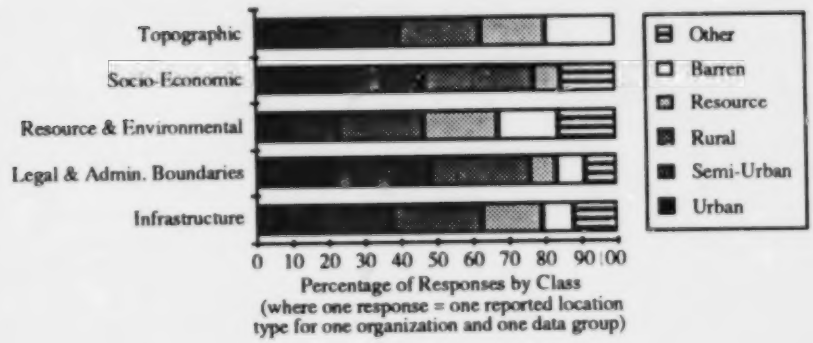

Topographic
Socio-Economic
Resource & Environmental
Legal & Admin. Boundaries
Infrastructure
0 10 20 30 40 50 60 70 80 90 100
Percentage of Responses by Class
(where one response = one reported scale
for one organization and one data group)
Other 1:1K 1:2.5K 1:5K 1:10K 1:20K
1:50K 1:250K 1:2M

- **Variances by Location** - Although specific individual data groups may only be required in relation to specific locations or types of locations in the Province, in general there is very little sensitivity of data requirement by location (ie. most data are required in relation to all locations in the Province).

DATA NEED BY LOCATION TYPE
REPORTED BY USERS OF LAND-RELATED DATA
(Consolidation of Question C-1.6)

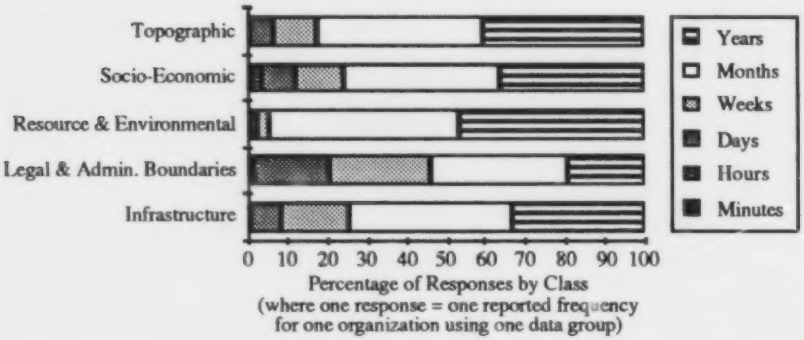


DATA CAPTURE BY LOCATION TYPE
REPORTED BY MANAGERS OF LAND-RELATED DATA
(Consolidation of Question C-2.7)

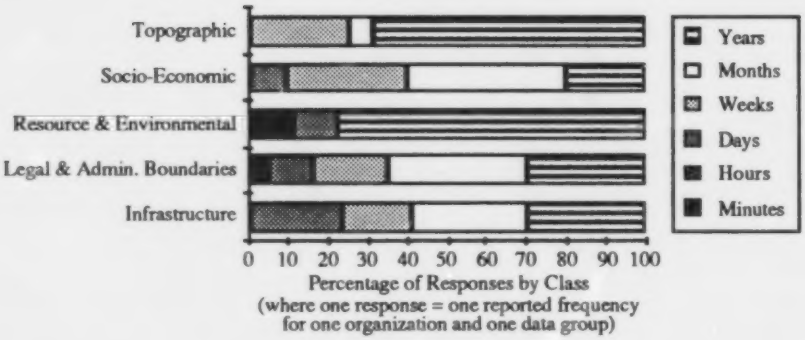


- **Data Currency** - The need for data currency varies greatly depending on the specific data involved. However, for the most part, land-related data can be months or even years out of date without affecting ability to achieve program objectives.

DATA CURRENCY NEEDS
REPORTED BY USERS OF LAND-RELATED DATA
(Consolidation of Question C-1.5)



DATA CURRENCY PROVIDED
BY MANAGERS OF LAND-RELATED DATA
(Consolidation of Question C-2.6)



- **Terrain Resource Information Management (TRIM)** - The data provided by TRIM are an absolutely essential component of the shared land data resource; however, as already indicated, there is a need for topographic data at scales other than those addressed by the TRIM Program.

  The TRIM data format (also called the MOEP data format - from the 1988 Ministry of Environment and Parks publication, "Specifications and Guidelines 1:20,000 Digital Mapping") is sufficient to generate a topological representation of data and will be encompassed within BC-SAIF, described below.

- **British Columbia Spatial Archive and Interchange Format (BC-SAIF)** - This standard is in the process of development, with a target date for completion of specifications sometime in the third or fourth quarter, 1989. It is intended to define a common archival storage specification and facilitate common exchange of data across government and industry in the Province of British Columbia.

  BC-SAIF has been defined on a very solid base. It encompasses aspects from the Spatial Data Transfer Specification (SDTS) currently under development in the United States and uses, where possible, the feature codes developed by the Canadian Council on Survey and Mapping (CCSM). Both of these are emerging as long term standards thereby providing assurance of the longevity of BC-SAIF. Also, many of the concepts of the MOEP format have been incorporated into BC-SAIF, providing assurance of upward compatibility of TRIM products.

  BC-SAIF supports vector, raster and business attribute data forms, making it one of the most complete formats available today.

  It should be noted, however, that BC-SAIF is an exchange and archive standard, not an online data management standard. It will be appropriate for exchange between the Corporate Domain and the Cartographic, Thematic LIS and Standard IS Domains and for off-line storage of any land-related data. It will not be appropriate for managing online data within the Corporate Domain itself; this will be dictated more by the specific vendor technology platform(s) within the Corporate Domain.

- **British Columbia Digital Provincial Atlas** - An electronic atlas concept has been defined that will include complete coverage of the province at very small scale (1:2,000,000), small scale (1:250,000 and 1:50,000) and medium scale (1:20,000). The medium scale will be based on TRIM products. The small scale will be similar in content and identical in format, but will include 1:50,000 stream networks combined with 1:250,000 planimetry and topography, along with other associated data. This data set, including selected boundary data, is planned to be complete for British Columbia within 12 months. Large scale mapping, pertinent to municipal mapping and facilities management , is also being considered within the atlas concept. All atlas data is planned to be available in the BC-SAIF format.

- **Baseline Thematic Mapping** - A "baseline thematic data" concept has been defined by the Ministry of Crown Lands and used by the Ministry of Environment in their "Corporate GIS for the Ministry of Environment Master Project Plan". It is intended as a common thematic background framework for use in the Thematic LIS Domain, but existing as a part of the overall baseline framework inherent in the Cartographic Domain.

  A standardized thematic coverage of the Province, based on this concept, is currently in a prototype stage. Its three constituent parts include ground cover, land use and topographic features, at scales of 1:250,000 and 1:20,000, with the source of the data being satellite

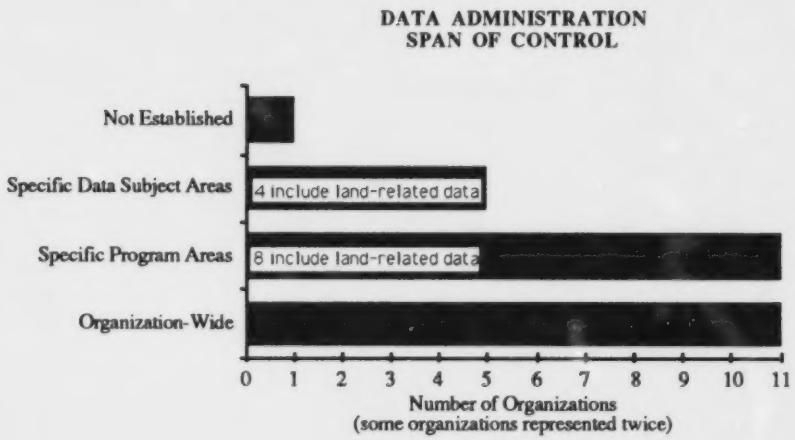
imagery and digital topography. In is intended that such data fall within the Digital Provincial Atlas, described above.

- **Data Definition Standards** - Other than TRIM, standards exist primarily for manual map production. Some work has been initiated by individual data administration groups in the area of data identification, terminology and meaning.

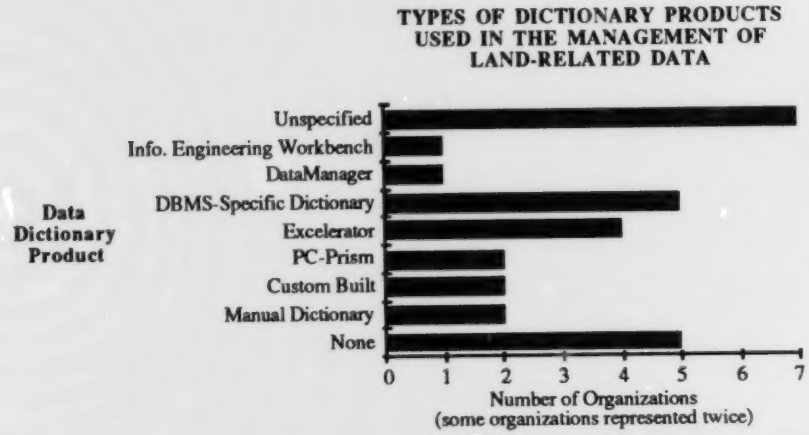
- **Data Inventory** - Although local agency-specific inventories may exist, an overall inventory of useful and significant land-related data does not exist. However, the framework and first level of the inventory have been provided by this study (see Appendix C).

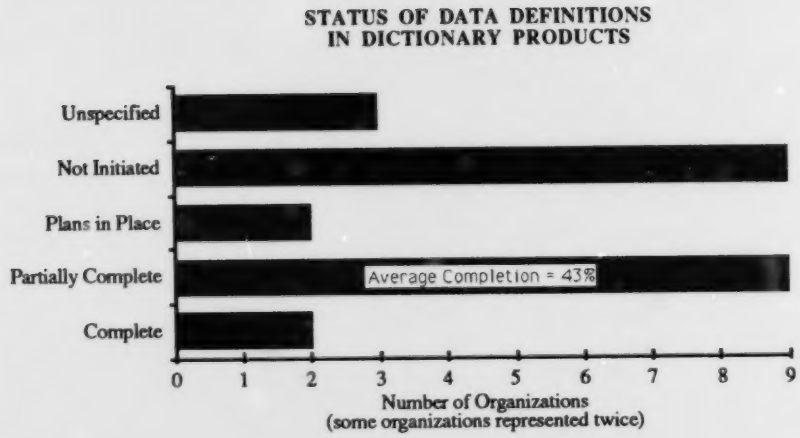
- **Data Management Principles** - An initial framework of data management principles has been prepared as a part of this study (see the section titled "Land Information Management Framework Recommendations" in Chapter 4).

- **Data Administration** - At a government-wide level, data administration appears to be in its infancy, particularly in the area of land-related data resource management. Well over one-half of the organizations surveyed do not yet have a formal data administration function; rather, data administration responsibilities tend to be distributed among various line agencies as a component of their line responsibilities. This indicates that the view of data as an organization-wide resource has not yet been fully endorsed. Achieving the next level of understanding, that certain data are a government-wide resource, will be a critical factor in the success of a government-wide initiative such as this. (A first step toward gaining this understanding has already been achieved; as has been previously highlighted, well over 90% of survey respondents indicated that land-related data are considered to be of government-wide value.)



- **Data Administration** (Continued) - As has already been indicated, sharing and consolidation of data definitions (ie. "meta-data") will be a necessary component in the overall sharing of land-related data. As the charts below indicate, sharing of definitions will face the issues of a multi-vendor, typically PC-based, dictionary environment and a general lack of local data definitions for contribution to a corporate dictionary.





APPLICATIONS ARCHITECTURE

Applications Classification

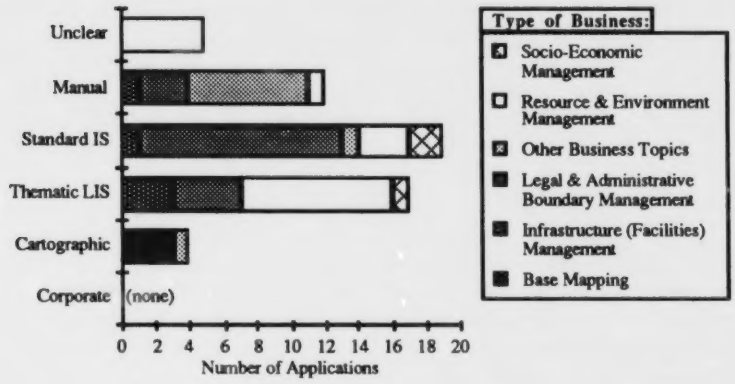
The Land Information Survey resulted in the identification of 56 land-related applications within the Government of British Columbia. Each of these have been reviewed, using only the information provided by the survey, and a domain classification that best reflects their current classification has been assigned. A list of applications, their classifications, and their relationship to the data groups in terms of data managed and used by each application, can be found in Appendix D - Applications Dictionary. Note that the domain classifications provided are based on limited information and, as such, are subject to change pending further investigation. Regardless of this fact, however, certain general observations and trends are apparent; these are the focus of the remainder of this section.

From the perspective of the Infrastructure, all current applications can be viewed as data management applications. That is, the classification of current applications is driven by the data managed by each application. Therefore (not surprisingly), the assignment of applications to domains results in something very similar to that for data:

- **Cartographic (Baseline)** - Base mapping, mapping control and geodetic control applications fall within the Cartographic Domain.
- **Thematic LIS** - Resource and environmentally based applications, infrastructure (or facilities) management applications and certain specific legal and administrative boundary management applications can be currently classified as Thematic LIS.
- **Standard IS** - A wide variety of applications are currently supported within the Standard IS Domain; a significant portion of these deal with legal and administrative boundary management.
- **Manual** - A portion of all applications can be viewed as existing within the Manual Domain. This can be explained via the fact that, in general, not all data within individual program mandates have been digitized. Unfortunately (or perhaps fortunately) the absence of automation does not relieve an organization from the necessity to capture and manage the data within their mandate.
- **Corporate** - Although certain initiatives are underway that could be considered Corporate, no current applications can be classified as Corporate.

The chart on the following page depicts the actual number of applications falling into each domain, along with an indication of the type of business activity supported within the application. Note that for some applications, a domain classification was not assigned; this was due to insufficient information within specific survey responses.

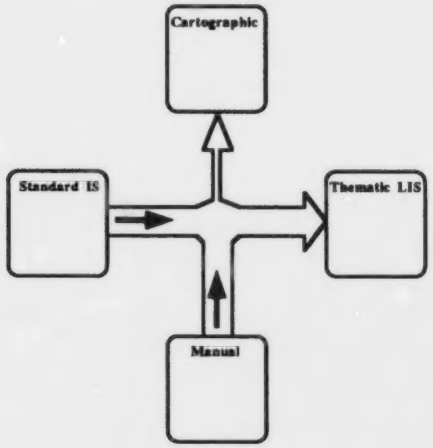
CLASSIFICATION OF CURRENT APPLICATIONS



Applications Assessment

The following general statements can be made about current land-related applications, as they relate to the Infrastructure:

- Applications tend to be designed from a program support orientation, with little or no recognition of the potential service to the government as a whole in the area of sharing land-related data.
- No distinct mechanism exists for the review of land-related application initiatives. Rather, all ministerial systems initiatives are subject to the same Treasury Board review, regardless of system type.
- There is a distinct trend toward applications management using Thematic LIS concepts and, less so Cartographic concepts, for applications that are currently within the Manual and Standard IS Domains. This trend is apparent from an analysis of future automation plans for individual applications. This is represented graphically below.



Current Situation

TECHNOLOGY ARCHITECTURE

Technology Classification

One aspect of the assignment of data and applications to domains has been the supporting technological platform. Similarly, plans for technology indicate the domains toward which existing data and applications are moving.

This is based on the fact that a rough correspondence exists between current types of technology and the four automated domains (Cartographic, Thematic LIS, Standard IS and Corporate). It must be emphasized, however, that this correspondence is based on today's technological capabilities and is not intended to be either a driving force or ongoing indicator of the positioning of specific data or applications within the Infrastructure. Rather, the correspondence is presented simply as a means for understanding the Infrastructure within the context of current technological capabilities. That said, the correspondence is as follows:

- **Geographic Information System (GIS)** - A GIS is a software package that supports the direct management of spatially referenced data in terms of a base definition of the land (eg. toponymy, planimetry, topography, landmark features) and specific business definitions of the land (eg. water license sites, waste permit locations, forest cover polygons, municipal boundaries). The combination of base and specific business land definitions supports the creation of maps as a by-product of the underlying geographic data management approach. The use of a GIS for managing spatially referenced business data is a current characterization of the technological platform within the Thematic LIS Domain; the use of a GIS for managing base land definitions, where those definitions are common and necessary across government and provided to any government agency with a need, would be a characterization of the Corporate Domain (although no use of GIS technology for Corporate purposes exists within the Government of BC today).

- **Database Management System (DBMS)** - A DBMS is a software package that manages business data in terms of business objects (eg. budgets, pensions, employees) and for which special handling of spatial data is not included, even though certain business data may be spatially referencable (eg. budgets may be for specific business regions, employees live in certain locations). DBMS's used in this sense are indicative of the type of technology employed in support of the Standard IS Domain. When a DBMS is used to manage business objects that are closely related to business definitions of the land, and these definitions are managed within a GIS, such combined use of GIS and DBMS technology platforms is indicative of the Thematic LIS Domain.

- **Computer Aided Design or Drafting (CAD) and Mapping Systems** - A CAD or mapping system manages collections of graphic elements within the context of a picture-frame (eg a map sheet). Each graphic element, and the picture-frame itself, can have associated with it specific data characteristics that have a correspondence to base or business objects; however, this correspondence is typically secondary to management of the visual representation of that data. Such technology is indicative of that which can be used to support either the Thematic LIS or Cartographic Domains, depending on the type of data so managed. Increasingly, CAD technology is seen as appropriate primarily for very narrowly defined graphic data capture activities.

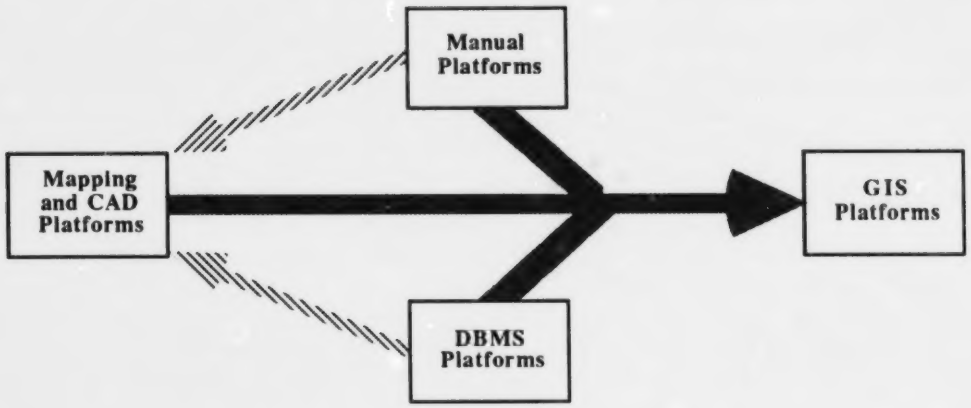
Also see Appendix E - Technology Dictionary for a detailed list of other technology platforms.

Current Situation

Technology Assessment

The following general statements can be made about the current use of technology, as it relates to the Infrastructure:

- There is no communication infrastructure for LIS applications. For the most part, applications are stand-alone with data sharing, if any, supported through the transfer of magnetic media (eg. tapes).
- Most applications are centralized, both from a data management standpoint and a processing standpoint.
- Applications are supported by single vendor platforms (with one notable exception; the Base Mapping application is supported by both CARIS and Intergraph).
- There is a significant trend away from manual systems, CAD systems, mapping and DBMS-oriented systems toward GIS-oriented systems. A smaller trend exists from manual and DBMS systems toward CAD and mapping systems, typically in those organizations that have had no prior LIS experience. This is represented below:



TECHNOLOGY PLATFORM TRENDS
In the BC Government LIS Arena

Current Situation

ORGANIZATIONAL ARCHITECTURE

Current Responsibilities

The current organizational architecture within the British Columbia LIS arena can be characterized in terms of the roles undertaken by individual organizations. The organizations that comprise this architecture (within the context of this study) and their specific roles are:

- **Ministry of Crown Lands** - Mandated to develop a program that rationalizes and consolidates government mapping and land information programs, using a corporate (ie. government-wide) approach. Specific corporate roles have also been established within Crown Lands line groups for:
  - **Corporate GIS/R&D Group** - Supports implementation of Crown Lands' corporate mandate by facilitating the development and implementation of a government-wide strategy for mapping and land information management.
  - **Geomatics Group** - Assumes a leading role in the development of corporate data exchange and archive standards and provides technical support in development of corporate architectures.
- **Land Information Strategic Committee (LISC)** - LISC and its associated subcommittees have a role in supporting Crown Lands' corporate mandate by coordinating the development and implementation of a government-wide strategy for mapping and land information management.
- **Office of Information Technology (OIT)** - Provides the roles of leadership, guidance and management focus in information systems and telecommunications, including a strategy and policy development role focused on encouraging effective use of technology as a means to improving service within government.
- **Treasury Board** - Fulfills the funding approval role for all major LIS initiatives.
- **Individual Ministries and Crown Corporations** - Assume the role of managers and developers of specific land information systems in support of program delivery.

Relative to the organizational responsibilities required in support of the Infrastructure (as presented in the previous chapter of this document), the current organizational responsibilities arising from the above roles are:

Infrastructure Responsibilities

- **Coordination**
  - LISC is responsible for coordinating the joint activities of various groups with an interest in the development of land information systems.
  - OIT is responsible for the development of strategies, policies and procedures that encourage the effective use of information technology and for providing strategic direction in the area of information management.

- **Communication** - This functional responsibility rests with the Ministry of Crown Lands Corporate GIS/R&D Group. Although the basic structure is in place for supporting this function, it is presently performed in a cursory and ad-hoc manner.

- **Facilitation** - The Ministry of Crown Lands Corporate GIS/R&D Group, with assistance from the Geomatics Group, is responsible for facilitating the Land Information Infrastructure. Roles and responsibilities relative to this area are currently being defined, through consultation with this project, and are not yet implemented (these specific responsibilities are discussed further in the next chapter of the document).

- **Marketing and Distribution** - Responsibilities for marketing and distribution of government land information and related technology have not yet been formally defined or adopted. Rather,
  - Individual Ministries and Crown Corporations have performed this function as needed in support of individual program delivery mandates.
  - The Ministry of Crown Lands, in viewing land information as a corporate resource, has identified a role to pursue opportunities for increasing revenue from the marketing of land information in a variety of forms. This includes the possible distribution of land information through licensed private sector vendors.
  - The Economic Diversification group within the Ministry of Regional Development has been given general responsibility for promoting B.C. technology in all markets.

Program Responsibilities

- **Program Delivery** - Program delivery is the responsibility of individual Ministries and Crown Corporations in support of their mandates.

- **LIS Development** - LIS development, involving all activities related to the development of land information systems is the responsibility of individual Ministries and Crown Corporations. The introduction and implementation of the corporate aspect of land information will extend the scope of activity in this area, primarily in support of data access and exchange.

- **LIS Operations** - LIS operations are the responsibility of individual Ministries and Crown Corporations. The introduction of the corporate viewpoint will expand the scope of LIS operations activities, especially in the area of Data Administration.

Organizational Assessment

The comparison of current responsibilities to the responsibilities inherent in the Infrastructure reveal:

1. The roles and responsibilities of LISC and OIT, within the areas of mapping and land information strategy and related coordination activities, and the interrelationship between these two bodies require clarification. This stems primarily from the overlapping focus of the two: OIT is concerned with information management in general whereas LISC is specifically concerned with **land** information management. This subsetting of focus suggests that the coordination activities of LISC should reflect the high level strategies, policies, procedures and standards established by OIT.

2. Responsibility for marketing and distribution of corporate land information is not yet defined. Crown Lands has identified a role in this area, but at present the underlying organizational requirements have not been met.

3. Although responsibilities for communication and facilitation are in place within Crown Lands, the group assigned these responsibilities has only recently been established. Required are a confirmation of roles and better definition of responsibilities; this, in turn, will assist the group in establishing resource levels and functional priorities relative to specific goals and objectives.

4. The development, implementation and maintenance of applications within the Infrastructure will impact the program delivery, LIS development and LIS operations functions of all Ministries and Crown Corporations involved in land information management and use. This will be particularly true in the areas of Data Administration and Applications Management.

MAJOR CONCLUSIONS

The general situation in the arena of land information management in the Government of British Columbia can be characterized as one of significant opportunity. The Government is well positioned, both technically and organizationally, to pursue their corporate goals in land information management. No major roadblocks, either current or as a result of historical mistakes, exist. A general willingness exists across the Government to support and contribute to these corporate goals. [In fact, based on our knowledge of the situation in other Provinces, British Columbia is at the forefront in Canada today.]

The specific, major conclusions and observations arising from the assessment of the current situation are:

1. *Topographic, cadastral and general administrative boundary data form the key foundations for most land-related applications.*
   - For the purposes of land-related data collection and comparison, a common definition of the land is prerequisite. Topographic, cadastral and administrative definitions of the land are those that are most prevalent[1].
   - These data are required in digital form at a variety of scales with a broad coverage of the Province. At present these data are only partially digital, with shortfalls in needed scales and coverage.

2. *There is a strong need and demand for this data managed in a corporate manner.*
   - Data sharing and comparison can only be achieved where consistent base land definitions are employed. Corporate standardization is central to achieving this compatibility.

3. *There is a definite opportunity and need for data sharing and exchange between distinct program areas.*
   - For example, there is an increasing demand for the integration of various thematic data through the background georeferencing framework provided by the data in item 1, above.
   - The commonality of data needs highlights the opportunity for a single, coordinated approach to developing a solution addressing these needs.

4. *Ministries and Crown Agencies are and will continue to be the source for all land-related data -- their initiatives must continue and must be supported.*
   - A corporate undertaking such as this is seen as a means toward enhancing service delivery within individual program areas. The contributions of each government agency will be the backbone in attaining corporate goals. Centralization of data management responsibilities would only serve to diffuse the focus of individual programs and, ultimately, contribute to the downfall of corporate goals.

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[1] The terms "topographic", "cadastral" and "general administrative boundary" are assumed here to encompass their broadest possible definitions. For example, "cadastral data" should be viewed as any data representing a legal encumbrance on the land and "topographic data" should be considered as any base description of the land surface.

5. *There is an immediate need to show governmental direction.*

- Individual agencies, in the absence of a Corporate direction, are starting to and will continue to develop solutions to their need for sharing land information. The redundancy inherent in this approach will be costly for the government as a whole. Lack of a common approach will increase difficulties in attaining a Corporate solution while commitment to Corporate solutions will diminish when these varied, alternate solutions are found and developed.
- TRIM, BC-SAIF and the existence of LISC itself demonstrate that the British Columbia Government is capable of pursuing initiatives on a government-wide scale.
- There is a general willingness and desire by all government agencies to pursue and participate in a Corporate endeavor. Such positive momentum must be leveraged, now, to the benefit of all concerned.

CHAPTER 4 - TARGET SITUATION

OVERVIEW

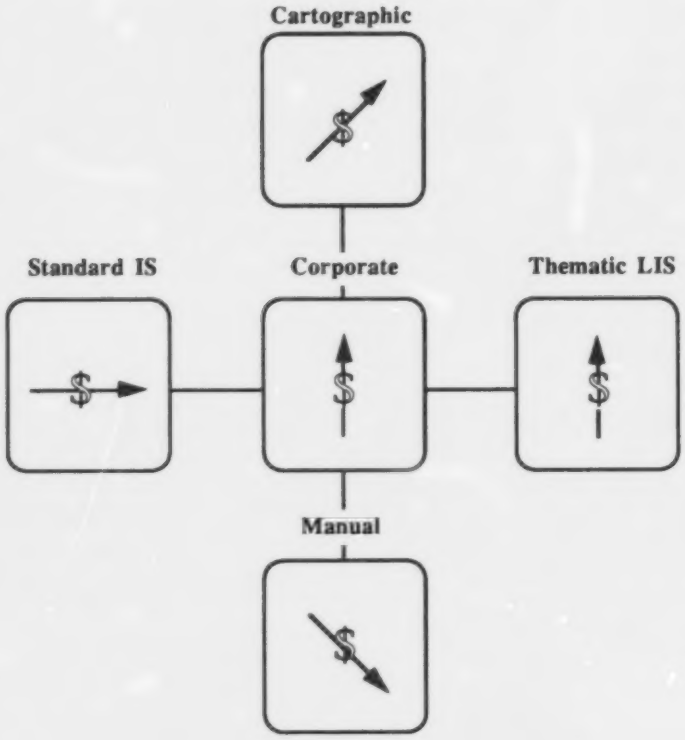
This chapter represents the recommended medium term direction for the Government of British Columbia in mapping and land information management. It puts forward general targets and recommendations related to data, applications, technology, management, organization and implementation.

The intent here is to put forward realistic, attainable targets for the Province that assist in achieving corporate goals in mapping and land information management. It is not intended to represent some final vision of the long term future.

The rationale for this statement is that for the current and foreseeable future, developments in this area will be technology-driven. By the time the targets detailed here have been achieved, available technologies will have changed significantly. In other words, the long term target is one in which technology is no longer the driving force. When this is the case, the criteria for inclusion of specific data within the Corporate Domain will be simply whether the data are required by more than one organization. Since most data are currently required by more than one organization, all data would probably be managed within the Corporate Domain. Since this long term target is neither currently realistic nor attainable within the next several years, it has not been pursued any further.

GENERAL DIRECTIONS

In the medium term the focus on each of the individual domains, primarily characterized by levels of investment, can be illustrated as follows:



That is, within the

- Cartographic Domain - Although investments in this area may tend to increase over the short term, as more of the baseline framework is provisioned in digital form investment levels will tend to level off and, ultimately, decrease.
- Thematic LIS Domain - Investments will tend to increase dramatically as more organizations move toward the GIS environment.
- Manual Domain - Investments will decrease as more automation is introduced.
- Standard IS Domain - Although investments will tend to increase in this domain as a normal consequence of the automation of operational activities, those applications that have a land-related component will tend to build within the Thematic LIS domain.
- Corporate Domain - Rapid growth in investments are anticipated in response to the implementation of the Land Information Infrastructure.

The nature of these investments will be discussed in the next several sections.

Target Situation

From a conceptual point of view, the target data, applications and technology architectures can be represented as on the attached diagram. The diagram illustrates that:

- The primary focus of the target is on the sharing of data between domains, via the Corporate domain.
- A repository (data dictionary, data inventory and applications inventory) of all shareable land-related data will be provided in the Corporate domain. It will be central to locating and accessing shared land data resources in other domains.
- Multiple technology platforms will be supported in each domain; within the Corporate domain, these platforms will be seamless (ie. transparent to a user of the Corporate domain).
- Within each Thematic LIS and Standard IS technology platform, a mechanism will be required for translation from the specific technology data format to the corporate standard data format (and vice-versa).
- Transfers between the Cartographic domain and the Corporate domain will be unidirectional. That is, the Cartographic domain provides baseline referencing data to the Corporate domain, where it is stored in a format that is exchangable with the other domains. The implication of this is that existing Cartographic applications will not be modified to act in a Corporate capacity, but rather, a Corporate data management application will be built to support baseline data exchange.
- The Manual domain contains no data or applications.

More specific data, applications and technology targets, by domain, are presented in the next three sections.

B.C. LAND INFORMATION INFRASTRUCTURE
Target Data, Applications & Technology Architectures

Target Situation

DATA ARCHITECTURE RECOMMENDATIONS

Targets By Domain

A detailed assignment of data groups to target domains has been done and can be found in Appendix C - Data Dictionary. At a summary level, the target data environment can be characterized in terms of the domain classification of major data groupings. Specifically, the target data architecture, by domain, is as follows:

1. **Cartographic (Baseline) Domain**
   - Source Topographic Data - Airborne or satellite remote sensing data will continue to be managed within the Cartographic Domain.

2. **Thematic LIS Domain**
   - All Resource and Environmental Data
   - Specific Legal and Administrative Boundary Data - Includes any data on titles, licences, permits, assessments or administrative regions that support specific program mandates.
   - All Infrastructure (Facilities) Data
   - Georeferenced Socio-Economic Data - Any socio-economic data that is explicitly georeferenced should be managed within the Thematic LIS Domain. This includes data about land use and demographics.

3. **Standard IS Domain**
   - Georeferencable Socio-Economic Data - Any socio-economic data that is not explicitly georeferenced, but that has georeferencable characteristics should be managed within the Standard IS Domain. Of the data groups identified in the survey, only personal and corporate taxation data falls within this category.

4. **Manual Domain**
   - No land-related data should be managed within the Manual Domain.

5. **Corporate Domain**
   - Topographic (Baseline) Data - Any data descriptive of the land surface.
   - Cadastral Data - Data representing any legal encumbrance on the land.
   - General Administrative Boundary Data - Includes data descriptive of commonly referenced administrative limits, such as Indian reservations, municipalities, parks, provincial borders and regional districts. Note that most administrative boundaries are defined in terms of other boundaries, and should therefore be considered to be Corporate.

Target Situation

APPLICATIONS ARCHITECTURE RECOMMENDATIONS

Targets By Domain

A detailed assignment of applications to target domains has been done and can be found in Appendix D - Applications Dictionary. The target applications environment can be characterized in much the same manner as the target data environment. The essential shift from the current situation to the target situation is in the movement from both the Standard IS and Manual Domains to the Thematic Domain.

Using groupings of applications, the content of individual domains will be as follows:

1. **Cartographic Domain**
   - Base Mapping and Geodetic Control - Although the data provisioned by these applications is considered to be Corporate, the underlying business functions are clearly not Corporate. That is, the business and professional expertise required in this area is highly specialized; placing these applications in the Corporate Domain would be tantamount to suggesting that all professional surveyors should now become professional data administrators. This is clearly not the case.

2. **Thematic LIS Domain**
   - Within this domain, the applications that provision data in the domain should be considered as Thematic LIS applications. Thus, this includes:
     - Resource and Environmental Management
     - Specific Legal and Administrative Boundary Management
     - Infrastructure (Facilities) Management
     - Socio-Economic Management (where the underlying data are explicitly georeferenced)
   - Each application within the Thematic LIS domain will have to incorporate the functionality necessary for translating data both from and to the Corporate standard (although the potential exists to develop only one translator per unique technology platform -- this will be investigated in the definition of projects in the Action Plan).

3. **Standard IS Domain**
   - Socio-Economic Management (where the underlying data are implicitly georeferencable).
   - Each application within the Standard IS domain will have to incorporate the functionality necessary for translating data both from and to a standard Corporate exchange format (as with the Thematic LIS domain, the potential exists to develop only one translator per unique technology platform).

4. **Manual Domain**
   - No applications

Target Situation

5. **Corporate Domain**

- Corporate Data Management - Data provisioned from Cartographic applications will need to be managed corporately, in a manner that facilitates direct and convenient access from the other domains. Reiterating, the data managed by these Corporate applications includes:

  - Topographic Data
  - Cadastral Data
  - General Administrative Boundary Data

  Note that the plans for the British Columbia Digital Atlas potentially fulfill a portion of the requirements of these applications.

- Corporate Repository - A corporate repository will be required in support of the management of data definitions, data inventories and applications inventories (per Chapter 2 under "Management Principles").

- Corporate Data Exchange - Applications that support the exchange of data with other domains will be required.

TECHNOLOGY ARCHITECTURE RECOMMENDATIONS

Targets By Domain

The target technology architecture, by domain, can be characterized as follows:

1. **Cartographic Domain**

   - Technological choices in the Cartographic Domain will be constrained by the need to meet specific Cartographic data standards (eg. the TRIM/MOEP format) and by the need to provision data to the Corporate Domain such that it can be translated to the Corporate format.

2. **Thematic LIS Domain**

   - Technology will have to meet data exchange requirements (probably BC-SAIF); where these requirements cover such aspects as: raster form data, vector form data, business attribute form data, meta-data, data communications, and topology representation.

   - Beyond this first constraint:

     - If the data are managed in "vector" form, the technology should support a topological data structure to allow the two-way interchange of data.

     - If the data are managed in "raster" form, technology choices will be open.

3. **Standard IS Domain**

   - No technology constraints will apply, however applications will have to incorporate certain functionality to allow data exchange.

4. **Manual Domain**

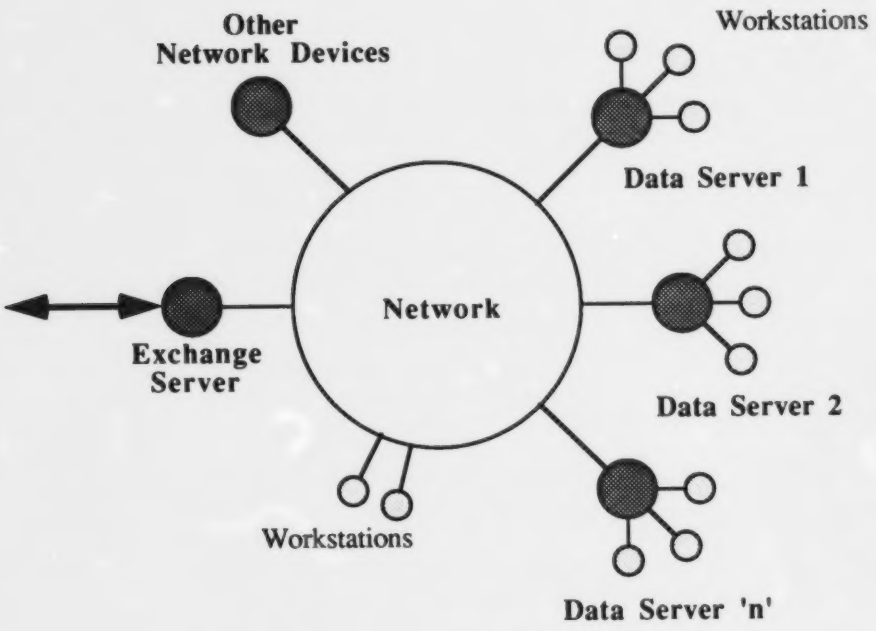
   - No technological implications

5. **Corporate Domain**

   The target technology architecture in the Corporate Domain will be characterized by (also see diagram on the next page):

   - A network;
   - A number of systems:
     - Data servers for corporate data management, and
     - Exchange servers to support data formatting and exchange with other domains;
   - Workstations associated with specific systems or linked directly to the network.

CORPORATE TECHNOLOGY PLATFORM



With respect to the implementation of this corporate technology platform, the choice of specific technologies will be governed by standards (already indicated in Chapter 2 under the Land Information Management Framework) covering:

- Communications Capabilities
- Workstation Capabilities
- GIS Package Standards
- DBMS Package Standards

These standards are driven primarily by the need to achieve transparency within the target, multiple technology, Corporate environment.

IMPLICATIONS OF THE TARGET ARCHITECTURES

When the target data, applications and technology architectures are compared to the current architectures, the following become apparent:

- There are no systems (ie. applications with their supporting technology) in the Corporate Domain; everything in the Corporate Domain will have to be developed.

- There is a strong focus on supporting and facilitating the pursuit of individual program mandates. Rather than impeding or burdening individual programs with Corporate responsibilities, separate Corporate applications have been defined to support these Corporate responsibilities.

- A significant investment will be required in order to realize the target architectures. However, this investment is necessary for the attainment of governmental goals in mapping and land information management.

- Current Cartographic systems fit within the target technology architecture, basically due to the fact that most cartographic applications already conform to a common Cartographic standard (ie. TRIM/MOEP format).

- Thematic LIS systems will have to be classified further in order to determine if they comply with the architecture (ie. classified as either Vector or Raster). An initial assignment of Thematic LIS applications to these classifications reveals that most systems are vector-oriented but are actually using graphic software, with no topological structure, as their technological platform. Examples include:

  - Crown Land Management (Crown Lands)
  - Geological Mapping (EMPR)
  - Forest Boundary Administration (Forests)
  - Mineral Titles Management (EMPR)

  The target architecture will see such systems put onto a topological platform, primarily as a means of facilitating the data exchange process.

- In line with one of the noted current application trends within British Columbia, the other major move will be the transfer of Manual and Standard IS systems onto a Thematic LIS topological platform.

LAND INFORMATION MANAGEMENT FRAMEWORK RECOMMENDATIONS

Evaluation of LIS Initiatives

Within the very near term, LISC will need to begin the process of examining and evaluating LIS initiatives from across government. About 80% of this review process will be performed by OIT and Treasury Board using traditional systems evaluation criteria. However, the other 20% of the review will be performed by LISC based on the initiative's conformance to the Land Information Infrastructure. The criteria that need to be applied, in the short term, for this aspect of the review are the focus of this section.

Prior to initiating an evaluation of any LIS initiative, the Infrastructure Domain classification will have to be established for the application and for the various data used and managed by the application. In order to facilitate this classification, a model of the data should be established as a prerequisite to a review of the submission -- without a clear definition of the data managed and used by the application, appropriate positioning and orientation of the initiative will not be possible. The domain classification criteria presented on page 14, under "Use of the Management Framework" should be used for this purpose.

Given this initial classification, the initiative should be evaluated in accordance with the following criteria:

Evaluation Criterion	Applicable Domain(s)
• Appropriate Domain classification?	All
• Availability of basic data?	All
• Exchangability of managed data within the Land Information Infrastructure Context?	All
• Functionality to exchange data with the Corporate Domain?	Thematic
• Compatibility of communication technology with Corporate Domain?	Thematic
• Technological compatibility?	Corporate
• Compliance to user interface standards?	Corporate

Initiatives that fail to meet any one of these criteria should either be rejected outright or released contingent on future compliance to the criteria. Note that in the very near term, the last three criteria will not be applicable since the necessary framework will not yet have been provided -- failure to comply in these circumstances must not be used to inhibit progress on otherwise useful Ministerial initiatives. Rather, the implications of the absence of the supporting framework should be recognized so that suitable accommodation can be made for future enhancement of the initiative.

Target Situation

Initial Land Information Management Principles

In order to support the eventual development of policies, procedures, standards and guidelines for land-related data, applications and their supporting technology, an initial version of such principles has been prepared. The principles outlined here directly support the Land Information Management Framework presented in Chapter 2 of this document. They are presented, to as great an extent as possible, in terms of the domains of the Land Information Infrastructure as a means of highlighting the extent of the Management Framework within each domain.

It is not the intent that these principles should be adopted outright, but rather that they be used as a guide for the kind of principles that need to be established.

General Data Management Principles

Policies

Any new data grouping will be categorized according to the data classification scheme prior to development of systems, either manual or automated, that address the collection, management or distribution of that data.

Creation and update of all data applicable to a specific data entity will be the responsibility of one and only one organizational entity. This organizational entity is referred to as the "data entity custodian".

Access to any data entity will be granted to any organization with a need for that data.

- Control of access is discussed under each of the individual domains.

Exchange between two domains will be via the corporate domain.

- Exchanges with the private sector will either be through the corporate domain or directly to the domain that contains the data required by the private sector.

The cost of data access will be borne by the accessing organization.

Guidelines

Recognized geographic data standards must be considered prior to developing any new standards (eg. for data exchange, data archive, data classification).

Corporate Data Management Principles

Policies

A review of the classification of any non-corporate data entity will be conducted whenever a corporate demand arises for the use of that data entity.

If the data recorded about a specific data entity are replicated across multiple data stores or domains, for the purposes of data creation and update there will be a designated "master" source for that data.

Target Situation

The corporate domain will be the designated master source for any corporate land-related identifier.

Updates will be applied to a specific data entity on a frequency consistent with the needs and capabilities of the data entity custodian.

A repository (dictionary and inventory) of all corporate data specifications and sources will be maintained within the corporate domain.

For this purpose, a standardized description of a data entity's specification will be provided to the corporate domain by the data entity custodian on initial creation or subsequent modification of that specification.

Standards

All corporate data must be stored using a data model that features topological structure (implicit or explicit).

Any land information coordinate within the corporate domain will be expressed according to one standard coordinate system. This coordinate system will be referred to as the "corporate coordinate system".

For any corporate data entity there will be at most one standard specification.

All data exchanges within the corporate domain will conform to a single standard data exchange format.

All data archive within the corporate domain will conform to a single standard data archive format.

Cartographic Data Management Principles

Policies

Whenever a cartographic data entity is updated, the updates will be provisioned to the corporate domain (if of corporate interest).

- This implies that those organizations responsible for mapping are the source for basic topographic information and are thus the master source for all updates to that information.

Standards

Any data within the cartographic domain must be translatable to the corporate standard.

- This translation may involve both manual and automated processing.

There are already a number of standard specifications defined for data entities in the cartographic domain (eg. for 1:20,000 map products); these standards will continue to apply.

There is a standard data exchange format within the cartographic domain for TRIM related data entities; this standard will continue to apply.

Target Situation

Thematic Data Management Principles

Policies

Access to thematic data will be controlled by the data entity's custodian.

Standards

Specifications for thematic data are at the discretion of the data entity custodian; however, such thematic data specifications should be developed in light of the possible uses of that data.

All thematic data should be translatable to and from the corporate data exchange standard.

Standard I.S. Data Management Principles

Policies

The corporate domain will contain sufficient tools and standards to enable synchronization of standard IS data with corporate data (specifically corporate data identifiers).

- Any such synchronization will be the responsibility of the associated application within the standard IS domain.

Access to standard IS data entities will be controlled and subject to the regulations and approval of the data entity custodian.

Standards

Specifications for standard IS data are at the discretion of the data entity custodian.

Manual Data Management Principles

Policies

Access to any manual data entity will be controlled by the data entity's custodian.

Standards

The standards already in existence for manual data will continue to apply.

Applications Management Policies

Any new Corporate automated land information application must be developed according to a LIS development framework.

- This framework will have to be acquired or developed.
- This framework must be solidly based on standard systems development frameworks using recognized development approaches.

All Corporate applications will be subject to ongoing Quality Assurance Reviews and, after successful installation, a Post-Implementation Review.

Applications Management Standards

All data exchanges between the corporate domain and the cartographic, thematic and standard IS domains will be supported through a standard data exchange application within the corporate domain.

All thematic data translation, either from or to the thematic data representation, will be supported by the source or destination thematic application.

All corporate applications will be constructed such that there is a transparency among applications within the corporate domain.

- This will be achieved through the definition of additional application standards and guidelines for corporate applications.

Applications Management Guidelines

All Corporate automated land-related applications should attempt to conform with a common user interface standard.

- This user interface standard will have to be defined.
- Available user interface standards should be considered in the definition of the BC standard (eg. IBM's user interface under SAA).

Technology Management Policies

Any new automated land information application within the Corporate, Thematic or Cartographic domains must be developed using a GIS software development platform (package).

All new communications infrastructure must take advantage of the the existing large investment in network technology already made by the Government of British Columbia.

Technology Management Standards

Any corporate GIS software package must support topological data structures, either implicitly or explicitly.

All corporate applications must support topological data structures, either implicitly or explicitly.

Within the corporate domain, all hardware must be linked together in a manner transparent to a user of the domain (ie. the user cannot tell and does not need to know which device they are interacting with).

- The technical implication of this standard is that real-time networking will be required within the corporate domain.

Communication with the corporate domain will be achieved through various media and will not be restricted to only one media.

- Examples of media possibilities include: magnetic tape, transferable disk, network communication, modem communication, and printed output (outbound only).

Technology Management Guidelines

Based on current trends, new technology platforms should be used such that data management functions are centralized and intensive data processing functions are distributed.

- Within any particular domain, this will tend to result in a network of intelligent workstations with various process, data management and file servers on that network. Within the cartographic domain, these servers will tend to be file servers; in the corporate and thematic domains, the servers will typically be data management servers.

ORGANIZATIONAL RECOMMENDATIONS

Target Responsibilities

The focus of this section is on ensuring that all of the responsibilities identified in the Organizational Architecture (Chapter 2) are assumed by specific organizational bodies.

The recommendations for each area of responsibility are:

- **Coordination** - LISC should continue to act in the coordination role. The distinction between LISC and OIT must be clarified; in general, LISC should reflect the high level strategies, policies, procedures and standards established by OIT.

- **Communication, Facilitation, Marketing and Distribution** - The consolidation of corporate responsibilities within the Ministry of Crown Lands has been based on a number of extensive studies; this consolidation was and will continue to be a strong base for realization of corporate goals. Similarly, LISC was founded as a supporting body to Crown Lands in this corporate mandate; it too should remain intact as the vehicle for providing direction to Crown Lands from other government agencies. The standards development subcommittees of LISC are necessary and sufficient for supporting Crown Lands in their facilitation role. However, at the current time, no LISC subcommittee exists for providing direction to Crown Lands in the areas of communication, marketing and distribution. Therefore, it is recommended that a Marketing and Promotions subcommittee be struck (this will be investigated further in the Action Plan).

- **Program Delivery** - As has been already indicated, Ministries and Crown Agencies are and will continue to be the source for all land-related data. Their initiatives must continue and must be supported.

- **LIS Development** - LIS development within the Corporate domain should be coordinated through the Ministry of Crown Lands, supported by the LISC Coordinating Group. Additional lines of support will be required between development teams acting in the other domains and Crown Lands, particularly with respect to data administration.

- **LIS Operations** - This will continue to be the responsibility of individual agencies. However, a support role will also be required within the Ministry of Crown Lands for coordinating the day-to-day sharing of land information.

As is readily apparent, the Ministry of Crown Lands plays a central role in the Infrastructure. At the current time, the Corporate GIS/R&D Group and the Geomatics Group within the Surveys and Resource Mapping Branch of Crown Lands are seen as the groups that will assume most of the corporate responsibilities. Given the level of visibility required for fulfilling corporate responsibilities and the current positioning of these groups within the Branch, consideration should be given to elevating at least the Corporate GIS/R&D Group within the Branch. [In fact, a recent strategic planning project within the Branch has recognized that it has two distinct lines of business, one internally-focused, the other external. This second business has been given the tentative title "Government Land Information Data Exchange" or GLIDE, for short. It is this business that should be elevated within the organization].

Target Situation

Three distinct groups should be established within GLIDE:

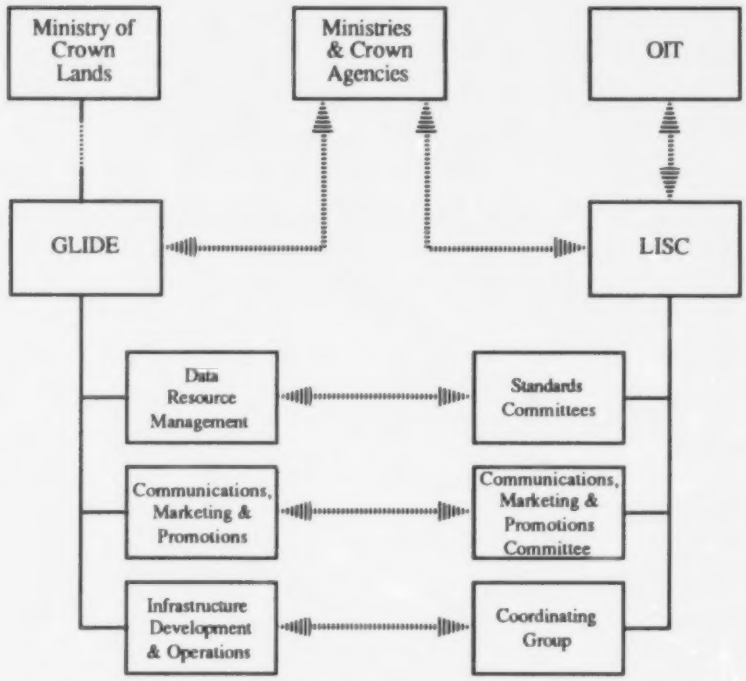
1. Data Resource Management - responsible for Corporate Land Data Administration, including the definition of necessary policies and standards for sharing of land-related data (per Data Resource Management portions of the Land Information Management Framework).

2. Communications, Marketing and Promotions - responsible for the day-to-day aspects of the communications, marketing and promotions functions.

3. Infrastructure Development and Operations - responsible for overseeing and supporting the development and operation of systems within the scope of the Infrastructure.

In total, somewhere from four to seven job positions (by group: 2-1-1 to 3-2-2) will be required to support the full set of GLIDE responsibilities.

LAND INFORMATION INFRASTRUCTURE
Recommended Organizational Structure



Most of these organizational changes will be required in the short term. All changes should be realized through a series of projects executed by both LISC and the current Corporate GIS/R&D Group. The specific projects involved will be the topic of the Action Plan.

Target Situation

RECOMMENDED IMPLEMENTATION STRATEGY

Approach

The key characteristics of the implementation strategy for the Infrastructure are:

- **Evolutionary** - The shear magnitude of the long term target dictates the need for a progressive, step-wise approach.
- **Target-Driven** - Cohesive and attainable targets must be established to move the Government of British Columbia from its current position to that of the final target.
- **Project-Oriented** - All initiatives within a specific target should be treated and managed as individual projects, facilitated by a central controlling authority.
- **Self-Correcting** - Each target should be evaluated and revised on a regular basis.

Initial Priorities

One of the questions in the Land Information Survey asked: "At a government-wide level, what actions should be considered in the near term (1-2 years)?". An analysis of responses to this question, along with the findings presented in the Current Situation, suggest that the focus of the first target should be:

1. Obtain understanding, agreement, and commitment to the BC Land Information Infrastructure by all Government Ministries and Crown Corporations.
2. Initiate construction in the Corporate Domain as a means of facilitating access to data widely required across organizations.
3. Facilitate initiatives in the Thematic LIS Domain, including the development and acceptance of data standards for archive and exchange.

Next Steps

The approach and priorities just discussed will be used as the focus for the next deliverable from this project, the "Land Information Infrastructure Migration Strategy and Action Plan". It will describe a series of projects to be undertaken over the next several years, including a detailed action plan and resource requirements over the next two years.

Target Situation

APPENDIX A - LIS STRATEGIES IN OTHER JURISDICTIONS

INTRODUCTION

Initiatives such as this one have been undertaken in many different national and international jurisdictions. Some of these include:

- Province of Alberta
- Province of Quebec
- Province of New Brunswick
- Province of Ontario
- Federal Government of Canada
- Australia
- New Zealand
- Switzerland

The intent of this part of the document is to examine a few of these jurisdictions to determine whether there are any strategic implications for British Columbia.

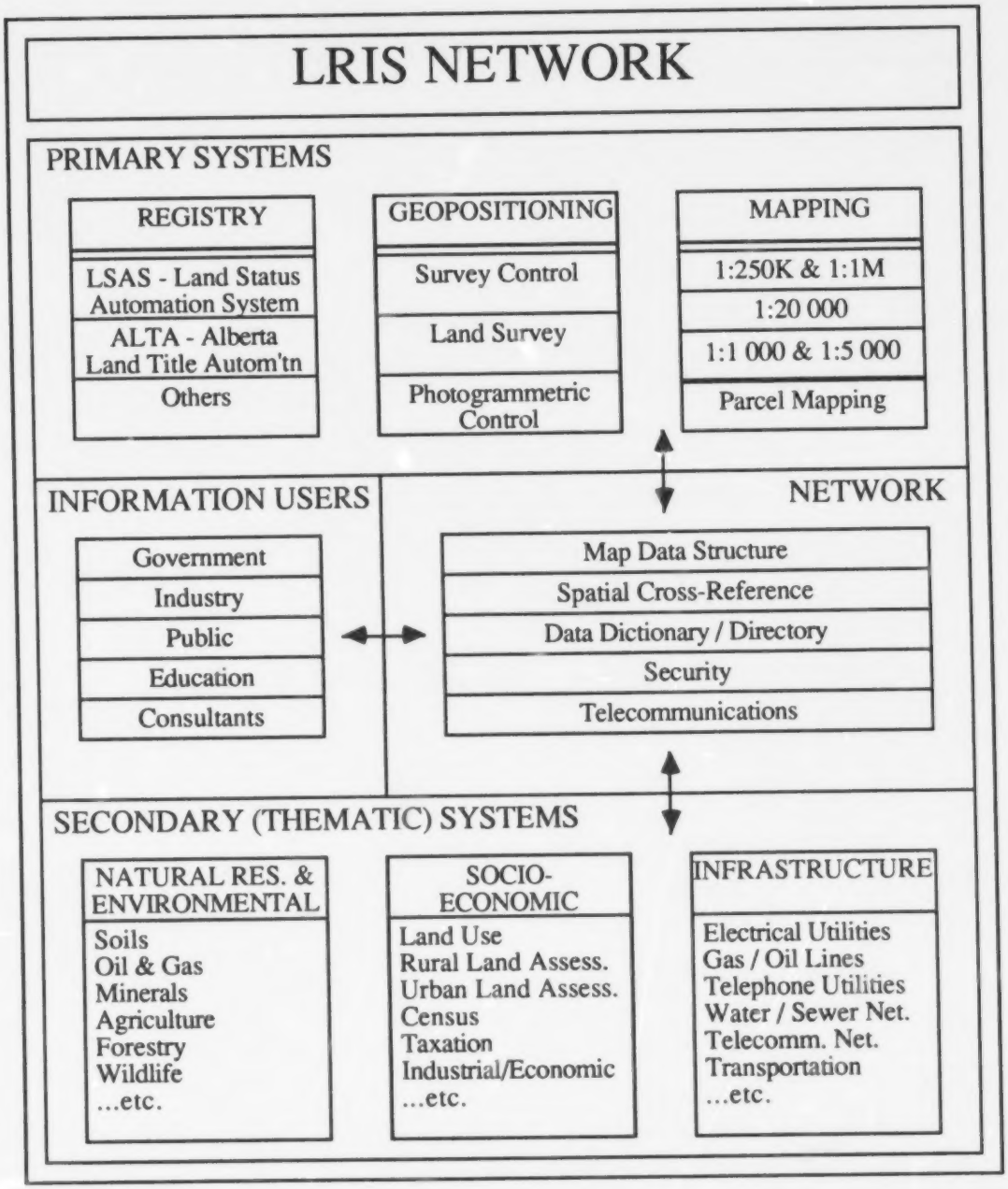
ALBERTA

- The Alberta government initiated the definition of a Land-Related Information System (LRIS) Network in 1974
- The project was officially adopted by the Province in 1982
- Twenty ministries and agencies have participated in the project over the past 10 years with an investment over $50M
- Another $200M is needed to complete the network by the year 2000
- The project identified three primary systems
  - Registry
  - Geo-Positioning
  - Mapping

  and over 30 thematic systems related to
  - Natural resources and the environment
  - Socio-economic themes
  - Infrastructure themes

  that are linked together by network subsystems (see diagram)

THE ALBERTA CONCEPT
(LRIS - Land-Related Information System)



- Primary systems will be completed by 1992
- A number of thematic systems are under development
- The network subsystem is in the planning phase
- The responsibility for coordination of LRIS Network development has been assigned to the "Land-Related Information Services Group"
- The "Land-Related Information Services Steering Committee" provides policy, direction and approval of development plans

QUEBEC

- Quebec has been active in the LIS strategies area since the late 1970's
- Study was done in 1983-84 (Rapport du Comite Governemental sur le Graphisme Numerique et les Banques de Donnees Localisees) covering the needs and uses of computer graphics and land-related databases
- The Province is in the process of defining a Corporate Land Information Systems Strategy; a document was produced in March 1988 recommending:
  - Development of a strategic plan
  - Development of a "Land Information System" which would result in the integration of a number of land-related information systems sharing a common database through communication interfaces
  - Roles of the private sector
  - Constitution of a permanent body to support the action plan
- Proposed short term plan (1988-90) includes:

  Urgent initiatives
  - Data inventory and classification
  - Definition of standards for data exchange
  - Experimental projects
  - Data gathering (1:20,000)
  - Development of a strategic plan

  Strategic initiatives for long-term positioning
  - Development of a training program
  - Plan and design of the "LIS"
  - Development of a data management policy and a data exchange policy
  - Implementation of a structure for communication among government, private and R&D sectors

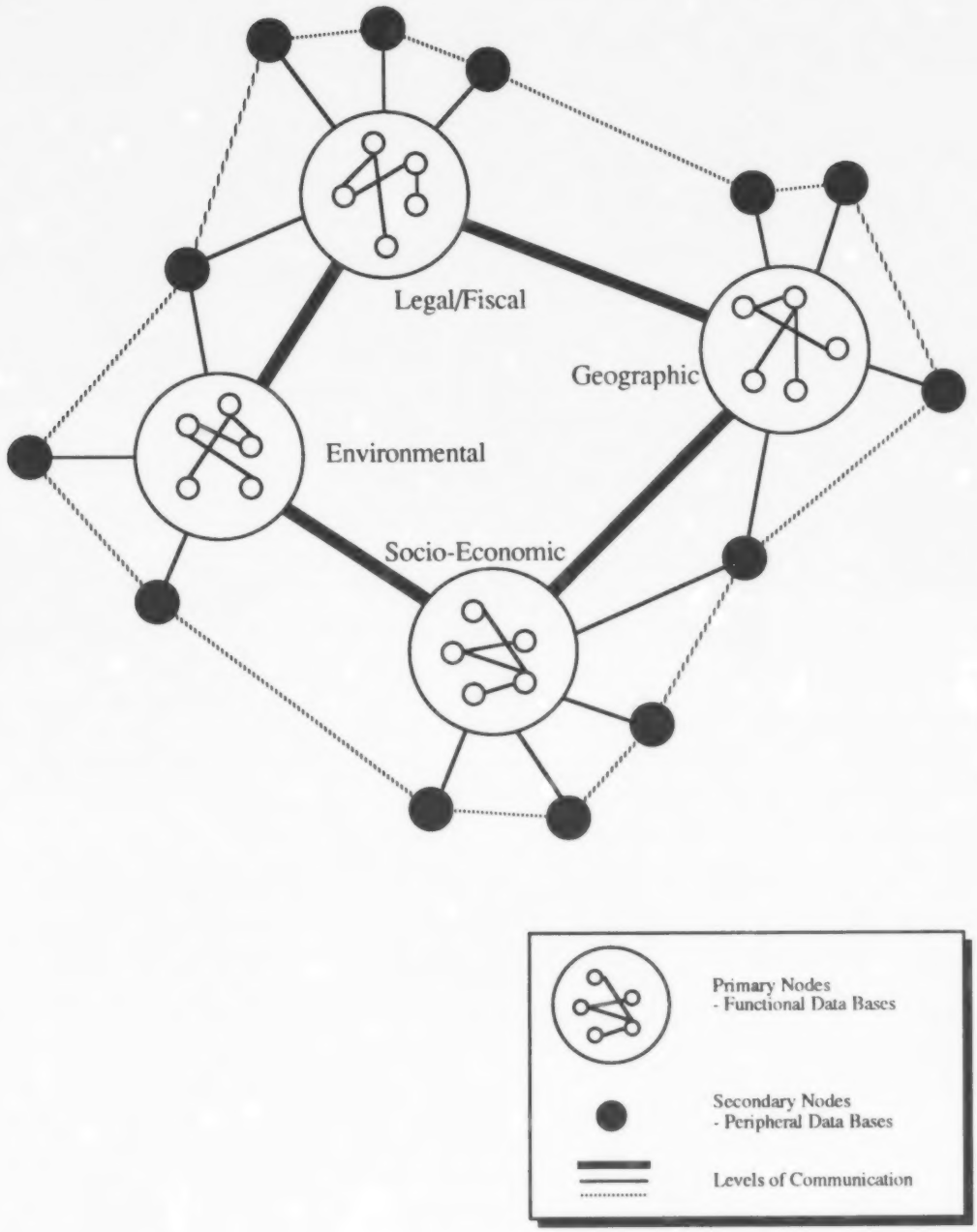
AUSTRALIA

- Australia has worked, over the past several years, on the development of a "total" land information system that employs a "nodal" approach (see diagram)
- Four primary nodes have been identified
  - Legal/fiscal
  - Geographic
  - Environmental
  - Socio-Economic
- A number of secondary nodes have also been identified that cluster around the primary nodes

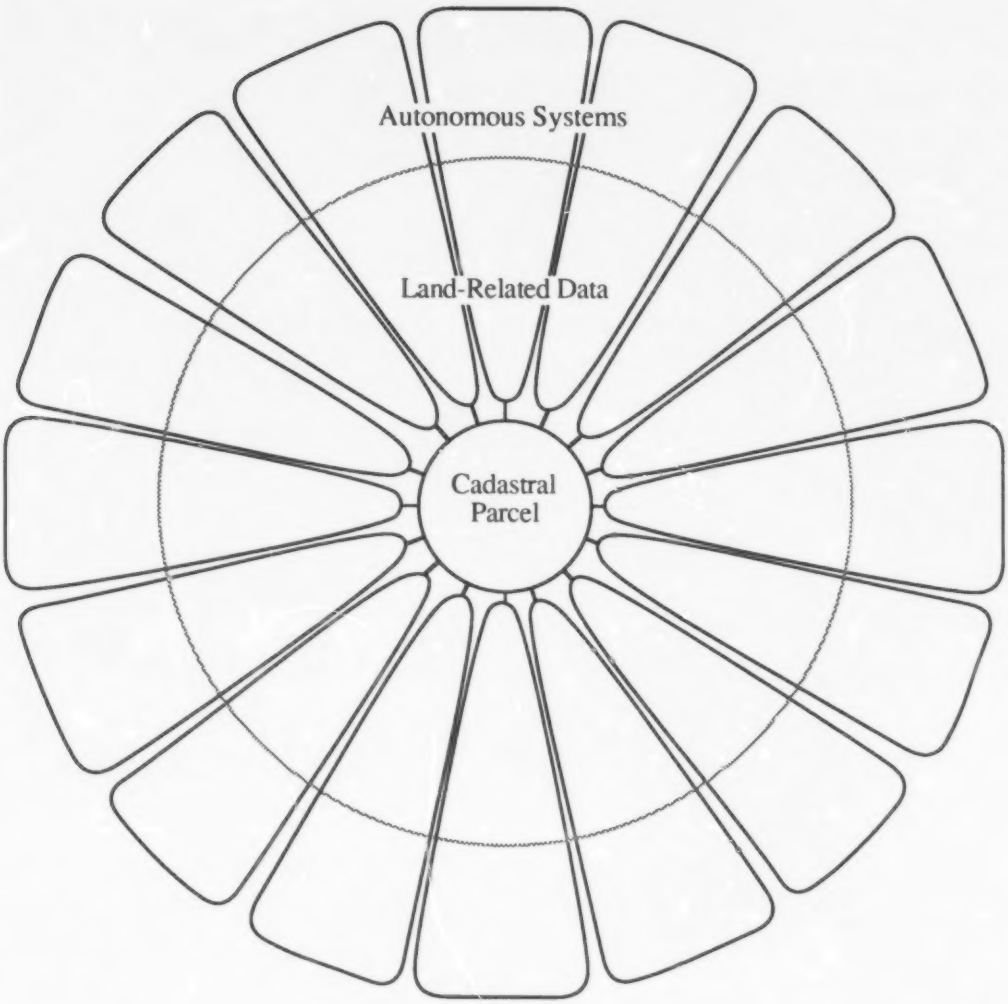
SWITZERLAND

- Final project definition report produced in 1987
- REMO project (Reforme de la Measuration Officielle)
  - The basic data set is defined and includes 11 themes that are described in a data catalog
  - The project for implementing a common database is planned to last for 20 years
  - The costs are shared among users (various levels of government)
  - The project has been justified on a cost/benefit basis
- SIT system (Systeme d'Information sur le Territoire)
  - A number of independent systems exist that can exchange information using a common land unit (see diagram)
  - The common land unit is the cadastral parcel

THE AUSTRALIAN CONCEPT
(Nodal Approach)



THE SWISS CONCEPT
(SIT - Systeme d'Information sur le Territoire)



KEY MESSAGES FOR BRITISH COLUMBIA

The British Columbia direction is consistent with these other jurisdictions, insofar as they have also identified the need for:

- Planning at the strategic, government-wide level;
- Development of the basic data set that should be used by most applications;
- Overall land-related information management distributed through a number of LIS applications which have been linked together;
- Policies and standards adopted at the highest level (covering such things as data definition and exchange);
- Large investment; and
- Definition of a "coordination and management structure" covering LIS activities.

APPENDIX B - TRENDS IN LAND INFORMATION SYSTEMS

Developments in the LIS arena have typically been driven by available technologies. This constraint will continue to apply and must be considered in the development of any LIS strategy, and are thus presented here so that British Columbia can take advantage of these trends in the development of its LIS strategies.

At a general level, LIS technology trends are driven by and taking advantage of technology trends in the standard data processing arena. Specifically:

1. **Trend toward a data management technology**

   - The technology has moved from a graphics production technology to a data management one (from map production to GIS systems);
   - The topological data structure associated with relational DBMS's is becoming the standard; on the other side, there is an increasing ability to integrate raster data (images) with vector data;

2. **Trend toward distributed processing**

   - Distributed processing architecture, using stand-alone workstations linked with a data/processing server is becoming a standard;
   - The power of workstations is increasing (CPU, memory, storage and networking capabilities) while their cost is decreasing;
   - This trend stresses the need for intensive networking capabilities;
   - The network has to be transparent to the user (i.e. knowing data location, CPU location and the like is irrelevant to the end-user);

3. **Trend toward distributed data management**

   - In the past, the LIS data management was centralized;
   - The actual or short term view is that a number of data servers (or thematic databases) can be linked together to exchange data;
   - The long term view is "real" distributed land data management; however, progress has to be made in distributed management of standard data prior to becoming a reality in the LIS field;

4. **Trend toward standardized hardware/communication architecture**

   - As mentioned, distributed processing architecture is becoming the standard;
   - Standard hardware is used as opposed to specific hardware developed by GIS vendors (e.g. dedicated graphics workstations that were developed by Intergraph and Synercom),

- Specialized hardware is used and integrated to this architecture as it becomes available (optical disks, array processing machines, etc.);

- Meanwhile, hardware independence (transparency) is achieved mainly through the use of standard relational DBMS's coupled with topological GIS's; note that, in the recent years, UNIX has facilitated the achievement of this hardware independence in certain environments.

5. **Trend toward data standardization**

- Given the high cost and value of land related data, the need for data exchange is recognized;

- A number of data exchange formats and standards have been developed or are under development such as:
  - ISIF (Intergraph Standard Interchange Format)
  - TIGER (Topologically Integrated Geographic Encoding and Referencing)
  - CCSM (Canadian Council on Surveys and Mapping)
  - DLG (Digital Line Graph)
  - MACDIF (Map and Chart Interchange Format)
  - MOEP (Ministry of Environment and Parks)
  - SDTS (Spatial Data Transfer Specification)

- None of these standards have received a wide acceptance yet and there is more work to do in this field;

6. **Trend toward a standardized approach for LIS development**

- GIS packages are now recognized by vendors and users to be development platforms (alike DBMS's) as opposed to turnkey systems;

- There is a recognition of the need to use structured approaches for the development and implementation of LIS as those used in standard information systems (these are called information system development methodologies); specific aspects related to LIS have to be taken into account when using those methodologies;

7. **Trend toward a standardized user interface**

- The user interface is becoming more friendly allowing systems to be used by non-specialists; industry-wide interface standards (specially graphics interface standards) are gaining acceptance in the GIS field.

APPENDIX C - DATA DICTIONARY

DATA MODELS

The attachment provides:

- A list of all data groupings identified by the survey, and
- A cross-reference between individual data groups and their current and target domain classifications.

With respect to the data groupings, it must be emphasized they are based on a very high-level survey in which different organizations provided different levels of detail (eg. some data can be viewed as groups of data groups, others as individual data entities). Further refinement of the groupings and their decomposition is required in order to obtain a balanced and consistent view of land-related data.

DATA DEFINITIONS

Definitions for each data group have been captured, with a specific emphasis on:

- Standards that apply to the data group;
- Short-comings identified for the data group as provided by survey respondents;
- The applications that create and use the data group; and
- Organizations that have an interest in or responsibility for the data group.

All of this information has been placed on an automated planning tool, PC-Prism, from which cross-reference matrices can be produced and manipulated. Specifically, matrices based on the last two items above have been created and were used as a part of the current assessment portion of this report. The information used to generate the matrices has been included with each data definition. Also note that this information has been turned over to the Surveys and Resource Mapping Branch, Crown Lands; interested parties should contact them directly.

Data Group	Topic	Current Domain						Target Domain				
		Corp.	Carto.	Them.	Std.	Man.	Uncl.	Corp.	Carto.	Them.	Std.	Man.
Electric Utilities	INFRA			1						1		
Ferry Terminal Site Plans	INFRA			1						1		
Government Buildings	INFRA				1					1		
Gas Pipelines	INFRA			1						1		
School Buildings	INFRA					1				1		
Transport	INFRA						1			1		
Wells	INFRA			1						1		
Cadastral	L&A		1					1				
Indian Reservations	L&A		1					1				
Municipalities	L&A					1		1				
Parks	L&A		1					1				
Provincial Borders	L&A		1					1				
Regional Districts	L&A				1			1				
Agricultural Land Reserve	L&A			1						1		
Border Grid Designation	L&A				1					1		
Community Planning Areas	L&A					1				1		
Designated Sites	L&A				1					1		
Development Regions	L&A				1					1		
Electoral Districts	L&A					1				1		
Ferry Terminal - Land Registry	L&A			1						1		
Flooding Reserves	L&A					1				1		
Forest Act Tenure Boundaries	L&A			1						1		
Forest Administration Boundaries	L&A			1						1		
Heritage Sites	L&A				1					1		
Improvement Districts	L&A					1				1		
Island Trust	L&A					1				1		
Land Assessment	L&A				1					1		
Land Title	L&A				1					1		
Mineral Title	L&A			1						1		
Park Use Permits	L&A				1					1		
Petroleum Title	L&A				1					1		
Polling Divisions	L&A					1				1		
Property Records	L&A				1					1		
School Districts	L&A					1				1		
Tourism Districts	L&A					1				1		
University Endowment Land	L&A					1				1		
Zoning	L&A					1				1		
Aquaculture	R&E				1					1		
Archaeological Sites	R&E				1					1		
Biogeoclimatic Zones	R&E			1						1		
Climate	R&E			1						1		
Crops	R&E					1				1		
Fisheries Habitat	R&E			1						1		
Forest Cover	R&E			1						1		
Geological Fields and Pools	R&E			1						1		
Geology	R&E			1						1		
Hydrocarbon Data	R&E			1						1		
Hydrographic Charts	R&E					1				1		
Hydrology	R&E			1						1		
Integrated Forest Land Information	R&E			1						1		
Minerals	R&E				1	1				1		
Soils	R&E			1		1				1		
Wildlife Habitat	R&E			1						1		
Wildlife Inventory	R&E					1				1		
Land Use	SOCIO			1		1				1		
Park User	SOCIO					1				1		
Population	SOCIO					1				1		
Taxation	SOCIO				1						1	
Airborne Remote Sensing	TOPO		1						1			
Satellite Remote Sensing	TOPO		1						1			
Building Location	TOPO		1					1				
Culture	TOPO		1					1				
Geodetic Control	TOPO		1					1				
Hydrography	TOPO		1					1				
Relief	TOPO		1					1				
Toponymy	TOPO		1					1				
Transport Location	TOPO		1					1				
Utilities Location	TOPO		1					1				

Appendix C - Data Dictionary

APPENDIX D - APPLICATIONS DICTIONARY

APPLICATION MODELS

The attachment provides:

- A list of all applications identified by the survey, and
- A cross-reference between individual applications and their current and target domain classifications.

APPLICATION DEFINITIONS

Definitions for each application have been captured, including:

- A description of the application;
- Organizational participation in the application;
- Data groups created and used by the application;
- The technology platform used by the application and any plans for changes to the technology platform;
- The extent to which automation supports the application;
- Plans for future automation;
- Current costs and benefits; and
- Future costs and benefits associated with automation plans.

All of this information has been placed on an automated planning tool, PC-Prism, from which cross-reference matrices can be produced and manipulated. Specifically, matrices based on the second, third and fourth items above have been created and were used as a part of the current assessment portion of this report. The information used to generate the matrices has been included with each application definition. Also note that this information has been turned over to the Surveys and Resource Mapping Branch, Crown Lands; interested parties should contact them directly.

Application Name	Org'n	Topic	Current Domain						Target Domain					
			Corp.	Carto.	Them.	Std.	Man.	Uncl.	Corp.	Carto.	Them.	Std.	Man.	Uncl.
Base Mapping	CL	BM		1					1	1				
Mapping Control	CL	BM		1					1	1				
Geodetic Control	CL	BM		1					1	1				
Marketing of Real Estate Assets	BC Rail	INFRA			1						1			
Rail Route Management	BC Rail	INFRA			1						1			
Geo-Facilities Information System	BC Hydro	INFRA			1						1			
Space Management	BCBC	INFRA				1					1			
BC Roadmap	Tourism	INFRA					1				1			
Forest Boundary Administration	Forest	L&A			1						1			
Mineral Titles Management	EMPR	L&A			1						1			
Crown Land Management	CL	L&A			1						1			
Research and Development	BC Ferry	L&A			1						1			
Property Management	BC Rail	L&A				1					1			
Real Estate Administration	BC Rail	L&A				1					1			
Land Status	Forest	L&A				1					1			
Land Title Registration	AG	L&A				1					1			
Aquaculture Operating Licence	Agr & Fsh	L&A				1					1			
Administration of Petroleum Titles	EMPR	L&A				1					1			
Well Licencing and Administration	EMPR	L&A				1					1			
Property Assessment	BCAA	L&A				1					1			
Property Management	BC Hydro	L&A				1					1			
Right-of-Way Acquisition	BC Hydro	L&A				1					1			
Data Provisioning	Reg Dev	L&A				1					1			
Park Use Permits	Parks	L&A				1					1			
Survey Control	CL	L&A					1				1			
Property Mapping	BC Hydro	L&A					1				1			
Electoral Mapping	Tourism	L&A					1				1			
Survey and Photogrammetry Services	BC Hydro	OTHER		1						1				
Property Acquisition and Disposal	BCBC	OTHER				1					1			
Land Development Management	Mun Aff	OTHER					1				1			
University Endowment Lands Management	Mun Aff	OTHER					1				1			
Islands Trust Management	Mun Aff	OTHER					1				1			
Municipal Administrative Map Production	Mun Aff	OTHER					1		1	1				
Telecommunications Site Management	BC Rail	OTHER					1				1			
School Enrollment Planning	Educ	OTHER					1				1			
Investment Opportunity Identification and Site Selection	IB & Imm	OTHER					1				1			
Petroleum Resource Analysis	BC Pet	R&E			1						1			
Petroleum Resource Analysis	EMPR	R&E			1						1			
Crop Insurance: Risk Management	Agr & Fsh	R&E			1						1			
Forest Resource Management	Forest	R&E			1						1			
Geological Mapping	EMPR	R&E			1						1			
Base Line Thematic Mapping	CL	R&E			1						1			
Thematic Mapping	CL	R&E			1						1			
GIS	CL	R&E			1						1			
Tourism Resource Capability	Tourism	R&E			1						1			
Geological Mineral Information Distribution	EMPR	R&E				1	1				1			
Archaeology and Outdoor Recreation Management	Mun Aff	R&E				1					1			
Production of Park System and Management Plans	Parks	R&E				1					1			
Environmental Monitoring	Env	R&E						1						1
Environmental Modeling	Env	R&E						1						1
Environmental Management	Env	R&E						1						1
Environmental Base Mapping	Env	R&E						1						1
Environmental License Management	Env	R&E						1						1
Land Use Planning	Agr & Fsh	SOCIO			1						1			
Land Occupancy Pricing	BCBC	SOCIO				1					1			
Park Attendance	Parks	SOCIO				1					1			

APPENDIX E - TECHNOLOGY DICTIONARY

TECHNOLOGY MODELS

The list below represents the technology platform types used for compilation of survey results. This information has been cross-referenced to current applications within the PC-Prism planning tool and was used as the basis for certain portions of this report. Interested parties should contact Surveys and Resource Mapping Branch, Crown Lands.

- HARDWARE
  - **Mainframe** - IBM, Other, Unknown
  - **Mini** - DEC/Vax, Prime, Tandem, Other, Unknown
  - **PC's** - IBM Compatible, Other, Unknown
  - **Terminals** - DEC Type, IBM Type, Tectronix, Other, Unknown
  - **Plotters** - Calcomp Pen, HP Pen, IBM Pen, Calcomp Electrostatic, Versatec Electrostatic, Other, Unknown
  - **Digitizers** - GTCO, Gentian, Talos, Kurta, Other, Unknown
  - **Data Gathering Tools** - Survey Instrumentation, Stereoplotters, Other, Unknown
  - **Workstations** - Intergraph, VAX Station, IBM, Other, Unknown
- SOFTWARE
  - **Graphics and Mapping** - Intergraph IGDS, Intergraph Microstation, AutoCAD, Bently, CARIS, QuickMap, GPG (IBM), IRIS, PC-Age, Other, Unknown
  - **DBMS** - Intergraph DRMS, IMS, SQL/DS, SAS, DBase, Other, Unknown
  - **GIS (Topology)** - PAMAP, Terrasoft, Intergraph, ESRI, Other, Unknown
  - **Image Processing** - MDA, Earth Probe, Other, Unknown
  - **Language** - Fortran, COBOL, Focus, Rally, Other, Unknown
  - **Other** - GeoLab, Ghost, DTM Software, Other, Unknown
- COMMUNICATIONS - Ethernet, SNA, CICS, Novell, DECNet, Other, Unknown

APPENDIX F - PARTICIPATING ORGANIZATIONS

The following organizations were asked to participate in the Land Information Survey:

British Columbia Government Ministries

- Advanced Education and Job Training
- Agriculture and Fisheries
- Attorney General
- Crown Lands
- Education
- Energy, Mines and Petroleum Resources
- Environment
- Finance and Corporate Relations
- Forests
- Government Management Services
- Health
- International Business and Immigration
- Labour and Consumer Services
- Municipal Affairs, Recreation and Culture
- Native Affairs
- Parks
- Regional Development and Ministers of State
- Social Services and Housing
- Solicitor General
- Tourism and Provincial Secretary
- Transportation and Highways

Crown Agencies

- B.C. Assessment Authority
- B.C. Buildings Corporation
- B.C. Ferries
- B.C. Hydro
- B.C. Petroleum
- B.C. Railway
- B.C. Systems Corporation
- B.C. Transit
- B.C. Utilities Commission
- Insurance Corporation of B.C.

GLOSSARY OF TERMS

Several terms within this document are used according to a specific intended meaning; also, certain terms may be unfamiliar to the reader due to the somewhat specialized nature of the topics covered by this document. Definitions of these terms are provided below.

APPLICATION - An "application", as used in this document, means: a set of business functions surrounding a common subject related to the achievement of specific program or organization goals and objectives. An application may span organizational boundaries and may contain both automated and manual components.

DATA GROUP and DATA ENTITY - see page 8.

DOMAINS - see page 5 for the complete set of definitions.

GEOREFERENCING - "Georeferencing" is the process of delimiting a given object, either physical (eg. a lake) or conceptual (eg. an administrative region), in terms of its spatial relationship to the land; the geographic reference thus established consists of points, lines, areas or volumes defined in terms of some coordinate system (usually latitude and longitude, or UTM northings and eastings, and elevation). The "background framework pertinent to georeferencing" includes: NTS and BCSG grids, survey control data, place names, planimetry, topography, hydrography, general satellite derived products descriptive of the terrain, and related features.

LAND - "Land" as used in this document encompasses all aspects of the terrain within the jurisdiction of the Government of British Columbia, including the terrestrial environment, fresh and salt water bodies, and the atmosphere.

LAND INFORMATION - "Land information" includes all information about the terrain itself plus any information that can be associated with the land, such as resource, environmental, socio-economic and infrastructure characteristics (these terms are described further in the section titled "Data Classification Scheme").

LAND-RELATED - The term "land-related", when used in this document, should be interpreted as covering anything within the above definition of "land information".

TECHNOLOGY - "Technology" is the hardware, software and communication tools through which manual tasks can be automated. Also see page 36 for a detailed definition of three distinct technology platforms: "Geographic Information System", "Database Management System" and "Computer Aided Design System".

Volume

2

A Corporate Land Information Strategic Plan
for the
Government of British Columbia

Volume 2

MIGRATION STRATEGY
&
ACTION PLAN

A Corporate Land Information Strategic Plan
for the
Government of British Columbia

Volume 2

MIGRATION STRATEGY
AND ACTION PLAN

Prepared By
DMR Group Inc.

for

LAND INFORMATION STRATEGIC COMMITTEE
and
MINISTRY OF CROWN LANDS

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CORPORATE LAND INFORMATION STRATEGIC PLAN
MIGRATION STRATEGY AND ACTION PLAN

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INTRODUCTION

PROJECT MANDATE AND APPROACH

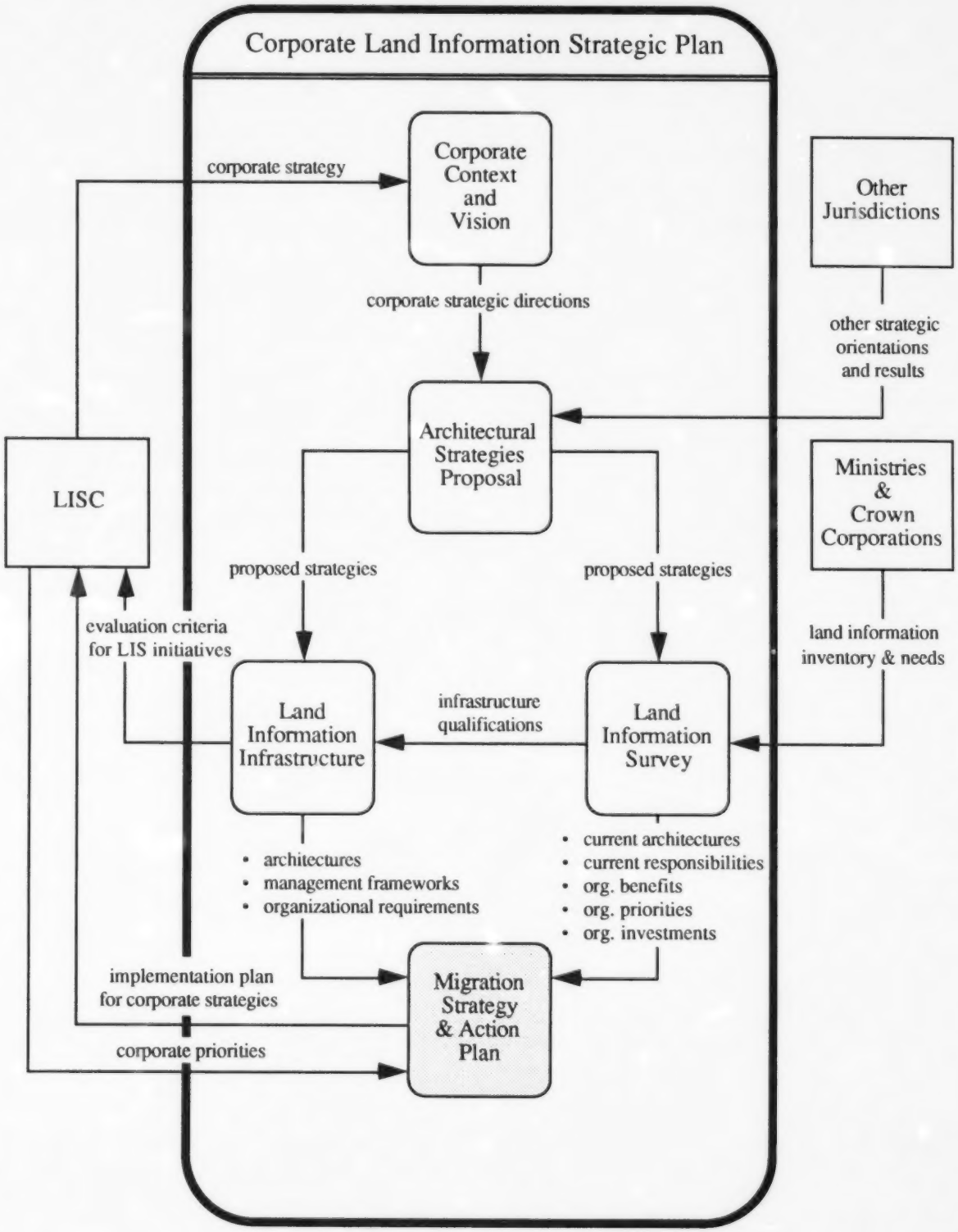
The mandate of the Corporate Land Information Strategic Plan (CLISP) project is to:

> *Develop and introduce a strategy for the Government of British Columbia to guide the development of a strategic framework for the management of land information in the Province.*

The attached model represents the approach that has been adopted for developing such a strategy. This document represents the Migration Strategy and Action Plan portion of that overall approach.

Through the Land Information Strategic Committee (LISC) Coordinating Group, governmental directions in land information and goals driving CLISP have been confirmed and a framework for the creation of a Land Information Infrastructure has been put in place. A survey of British Columbia Government Ministries and Crown Agencies has been conducted as a basis for confirming and refining the Infrastructure. Finally, a report entitled "Land Information Infrastructure" has been produced and accepted by LISC.

This last phase of CLISP is directed at establishing a migration strategy for moving the Government toward the targets established in the Infrastructure and detailing an action plan for implementation of the various target components of the Infrastructure.



Project Context

DOCUMENT OBJECTIVES

The specific objectives that have been established for CLISP are to:

1. Specify a corporate land information system infrastructure within which land related systems can evolve internal to government organizations that maximizes opportunities for data sharing and exchange between and within these organizations. Specific emphasis should be placed on means for provisioning, and relating corporate digital base maps to, georeferenced land information.
2. Develop a framework within which necessary and beneficial mapping and Land Information System (LIS) standards and conventions can be developed. Specific emphasis should be placed on data exchange standards and communication procedures and methods for access to and distribution of Provincial Government land information.
3. Establish a policy and procedural framework for the management of, and responsibility for, land information programs.
4. Develop the means for LISC to assess the positioning of land information related initiatives within the infrastructure.
5. Assess the positioning of current land related data, applications, technology and organizational responsibilities relative to the infrastructure, and put forward a migration strategy and action plan for the transition from this current position toward the target infrastructure.

This document is intended to address the migration strategy and action plan portion of the fifth objective.

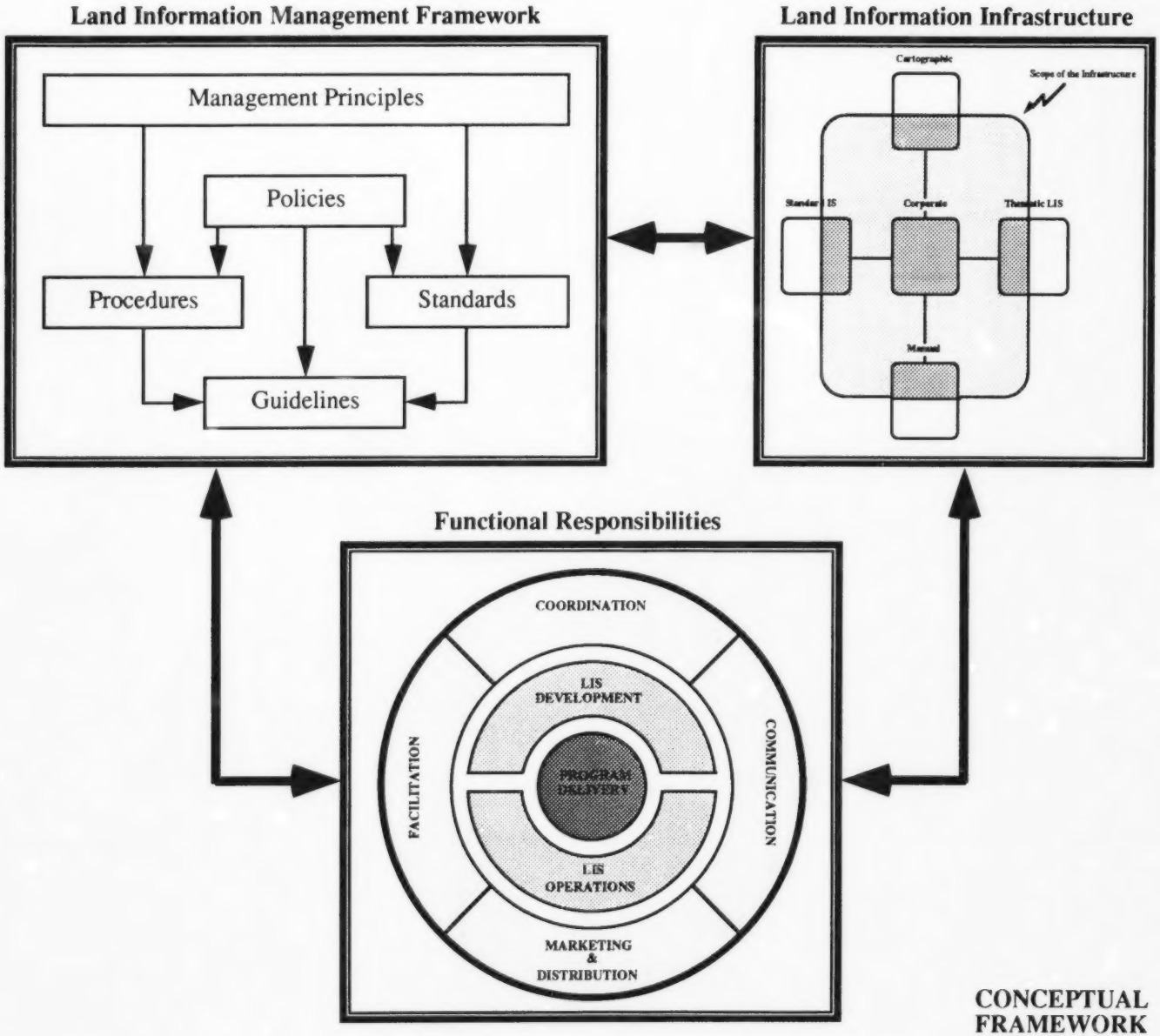
DOCUMENT STRUCTURE

The document is divided into two main chapters:

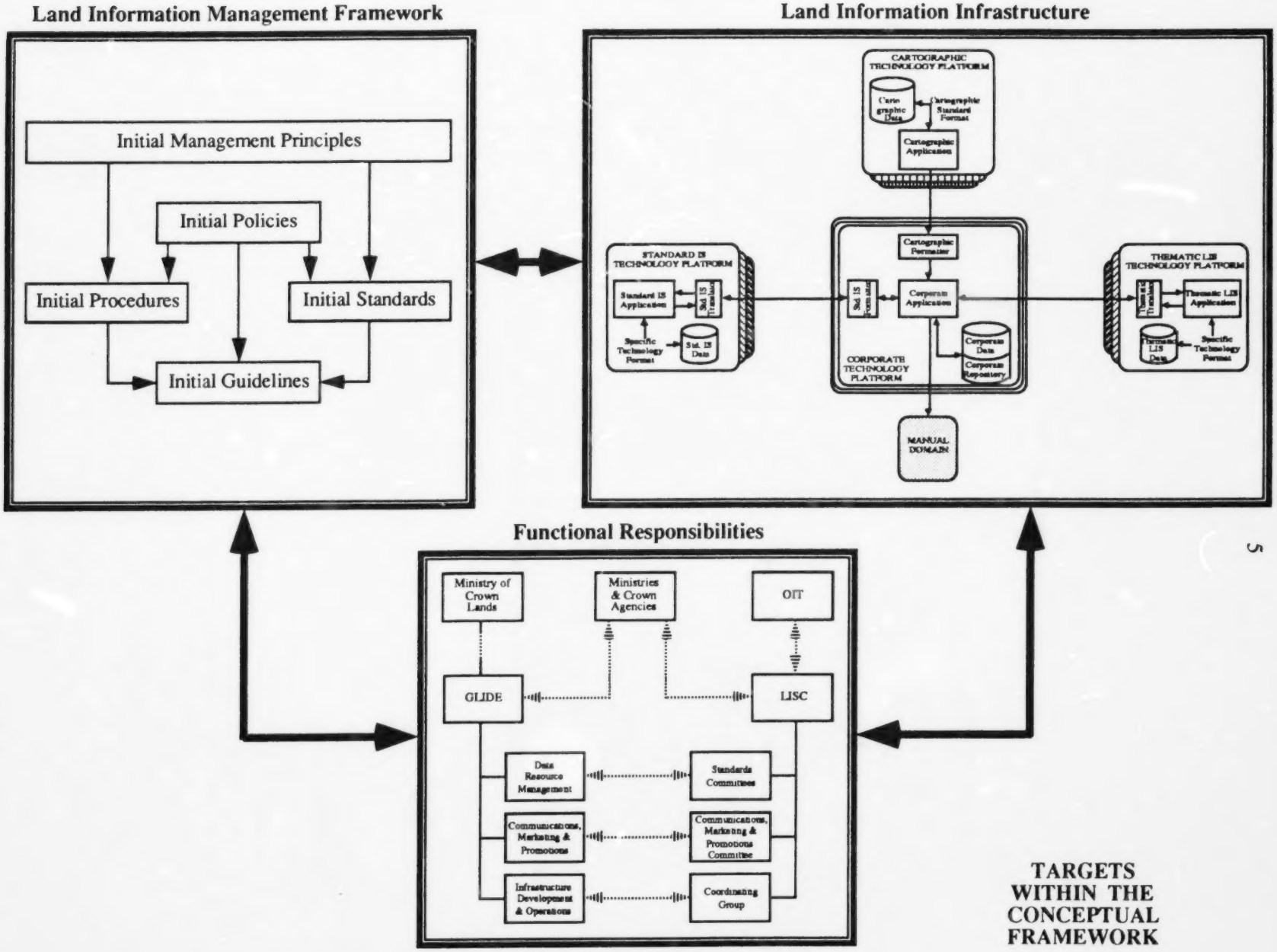
1. **Migration Strategy** - Establishes the essential thrust of required actions, including a definition of the factors that are strategic to attainment of, and constraints that may impede attainment of, the Infrastructure
2. **Action Plan** - Defines all actions required in the next two years in support of the Migration Strategy.

Within these two chapters, a common presentation framework has been adopted. There are three key components to the Land Information Infrastructure; it is these three components that form the structural base for the document:

1. The Land Information Infrastructure itself.
2. A Land Information Management Framework containing management principles, policies, procedures, standards and guidelines that govern the use of the Infrastructure.
3. Functional Responsibilities supporting the Infrastructure and the Management Framework.



CONCEPTUAL FRAMEWORK



TARGETS WITHIN THE CONCEPTUAL FRAMEWORK

MIGRATION STRATEGY

GENERAL STRATEGY

Approach

The key characteristics of the migration strategy for the Infrastructure are:

- **Evolutionary** - The shear magnitude of the long term target dictates the need for a progressive, step-wise approach.
- **Target-Driven** - Cohesive and attainable targets must be established to move the Government of British Columbia from its current position to that of the final target.
- **Project-Oriented** - All initiatives within a specific target should be treated and managed as individual projects, facilitated by a central controlling authority.
- **Self-Correcting** - Each target should be evaluated and revised on a regular basis.

Initial Priorities

The focus of the first target should be to:

1. Obtain understanding, agreement, and commitment to the BC Land Information Infrastructure by all Government Ministries and Crown Agencies.
2. Initiate construction in the Corporate Domain as a means of facilitating access to data widely required across organizations.
3. Facilitate initiatives in the Thematic LIS Domain, including the development and acceptance of data standards for archive and exchange.

It is this first target that is the subject of both the migration strategy and action plan presented in this document.

ORGANIZATIONAL STRATEGY

Thrust: Implement the organization that will support the Land Information Infrastructure.

Strategic Factors:

- Understanding of the benefits and relevance of Land Information Systems by government organizations.
  - Government organizations will continue to be the prime source of data for use within the Land Information Infrastructure; if individual organizations do not recognize the value of LIS, it is unlikely that they will dedicate the required time or resources to this undertaking.
- Understanding, agreement and commitment to the Land Information Infrastructure by government agencies.
  - The nature of the commitment required is long term. Many of the initiatives outlined in this document will not provide direct benefits until several years from now.
  - Obtaining initial agreement and commitment will require demonstrated progress within the short term. Ongoing commitment will require a continual demonstration of progress.
- Involvement by organizations beyond the government ministry context.
  - Specifically, Crown Corporations, Municipal and Regional Governments and the private sector must be made aware of this initiative and become involved in its development and extension.
  - The greater the participation, the greater the potential benefit to British Columbia.
- Clear assignment of roles and responsibilities.
  - This will be driven by the target functional responsibilities outlined in the Land Information Infrastructure.
  - This includes the reconciliation of LISC and OIT (Office of Information Technology) mandates, roles and responsibilities.
- Visibility and acceptance of GLIDE by government agencies.
  - GLIDE, the Government Land Information Data Exchange group within Crown Lands, plays the central operational role in the realization of corporate goals in mapping and land information management. It must be visible and it must be seen as fulfilling its corporate mandate.
  - GLIDE must not be yet another government bureaucracy; it will only be accepted when it is successful in adding value and being responsive to individual program needs.

Migration Strategy

Strategic Factors (continued):

- Effective communication with the diverse and large number of potential organizational participants.
  - Organizations that are in themselves lacking a unified voice will be virtually impossible to target for the establishment of ongoing working relationships.
  - In order to achieve a focal point within each organization, executives of each organization must be convinced of the need for a corporate approach and commit specific resources to the fulfillment of corporate objectives.
  - One indication of whether an organization has adopted a corporate stance, internally, is the presence of a Data Administration function within the organization. Data Administration is intended to support organization-wide needs and only typically exists when the organization has recognized and is willing to act on such needs. Similarly, Data Administration ultimately brings cohesiveness and integrity to the corporate data resource. Lack of a Data Administration function can imply that the integrity and validity of the data resource is lacking. Thus, participating organizations that do not have a Data Administration function represent an increased risk to the success of the Infrastructure, particularly where the organization is acting in the Corporate Domain.
- Stability and integrity of the Corporate Domain.
  - If organizations are going to place their trust in the data provided through the Corporate Domain, ongoing government commitment to supporting organizations must be demonstrated. Similarly, organizations must be assured, even guaranteed, that there will be no unexpected impacts on their business due to data changes within the Corporate Domain.

Constraints and Considerations:

- Within the government context, there will be a constraint on the addition of new staff (ie. FTE positions). The additional effort required to support an initiative such as this will require a shifting of both people and priorities within affected organizations. Such a re-allocation of scarce resources will only occur if organizations have committed to the need for the Land Information Infrastructure.

LAND INFORMATION MANAGEMENT FRAMEWORK STRATEGY

Thrust: Implement policies, standards, procedures and guidelines in support of the Land Information Infrastructure, both as a means of initiating construction in the Corporate Domain and facilitating actions in the Thematic LIS Domain.

Strategic Factors:

- Management of the perception of the Land Information Management Framework.
  - The benefits and necessity of the principles embodied in the Framework must be promoted.
  - Any managing principles (policies, standards, procedures and guidelines) that are defined must be meaningful and appropriate to individual programs. Principles cannot be defined simply for the sake of defining principles.
  - The Land Information Management Framework will be a significant and beneficial component of the overall Land Information Infrastructure. However, policies and standards, per se, can be misconstrued as administrative hindrances to program efforts. As such, organizations must be encouraged to comply with the Framework. In particular, some form of "fast-track" approval should be given to organizational initiatives that comply with the Framework.
- The Framework must be established early in the evolution of the Infrastructure.
  - The guiding principles laid down in the Framework will form the basis for many of the developments within this initiative. Without the Framework, individual projects will adopt their own standards, to the detriment of the underlying Corporate concept.
- Understanding, agreement and commitment to the Framework
  - In addition to the "fast-track" approval concept outlined above, a forum for multi-organization participation during definition and approval of the Framework must be established. The role of LISC within this will be to act on behalf of the government as a whole through coordination, marketing and communications with affected organizations. Commitment to the Framework will result from executive-level endorsement within each organization.

Constraints and Considerations:

- A number of excellent standards already exist or are already under development within the BC LIS arena (eg. BC-SAIF). Such standards must be incorporated into the Framework.

Migration Strategy

LAND INFORMATION INFRASTRUCTURE STRATEGY

Thrust: Initiate construction in the Corporate Domain as a means of facilitating access to those data that are widely required across organizations.

Strategic Factors:

- Commitment of funds to Corporate projects.
- Clear definition and understanding of the Corporate Land Data Resource.
- Architectural cohesiveness of Corporate systems.
- Ensuring the availability of baseline data
  - at a variety of scales, and
  - representing a broad coverage of the Province.
- Commitment to collection and use of baseline data.
- Ensuring the provision of a data dictionary and inventory.
- Ability to support the coexistence of a variety of current and future data formats.
- Ability to support access to data stored in the Corporate domain from locations across the Province.
- Ability to support access to data distributed throughout the Province.
- Ability to support a variety of technological platforms (although not all technological platforms will be supported).
- Minimal restriction or encumbering of individual program efforts.

Constraints and Considerations:

- The effort needed to convert existing data to a new Corporate standard will not be insignificant. Organizations will have to dedicate valuable and scarce resources to this task, such realignment of priorities will only occur if the organization has committed to the Infrastructure.
- A significant number of dollars and skilled human resources will be required to complete the projects within the Infrastructure. Money and people must be allocated to this Corporate endeavor.

Migration Strategy

ACTION PLAN

OVERVIEW

In this chapter, the projects that need to be initiated within the next two years are described. When completed, the Government of British Columbia will have a solid foundation for the sharing of land information, both internally across Government Ministries and externally with Crown Corporations, Crown Commissions, Regional Governments and Municipal Governments. Many of the governmental goals established for the Ministry of Crown Lands will be facilitated, including:

- Improved access to land information
- Facilitation of land information exchange
- Planning base for future land information needs
- Framework for pursuit of cost-sharing opportunities
- Improved quality of land information
- Framework for involving the private sector and marketing innovation arising from LIS initiatives.

Prior to describing the projects, a precedence network highlighting the dependencies between all projects is presented. This is followed by a master project schedule, illustrating the rough timeframes within which projects are expected to be initiated and completed. Finally, each project is defined in terms of:

- **Description** - An overview of the scope and intent of the project.
- **Deliverables** - An outline of the products expected from each project.
- **Responsibilities** - An identification of the organizational groups participating in the project.
- **Resources** - A general sizing of the project based on monetary, time, and human resources.

With respect to the costing of projects, it should be noted that costs only reflect the direct costs attributable to the project. Indirect costs, such as the time spent by non-project personnel in committees, presentations and reviews, have not been included. Similarly, no attempt has been made to rationalize project costs with existing program budgets.

PROJECT PRECEDENCE NETWORK

Based on an assessment of priorities, as established by LISC, and on the inherent prerequisites for each project, a precedence network has been prepared of each set of projects (ie. for the Organizational, Management Framework and Infrastructure sets of projects). Its intent is to highlight the order in which projects should be undertaken. Note that in some instances, projects are dependent on only a portion of the deliverables from a prior project; such opportunities for schedule compression have not been illustrated.

The precedence network is presented on the next two pages.

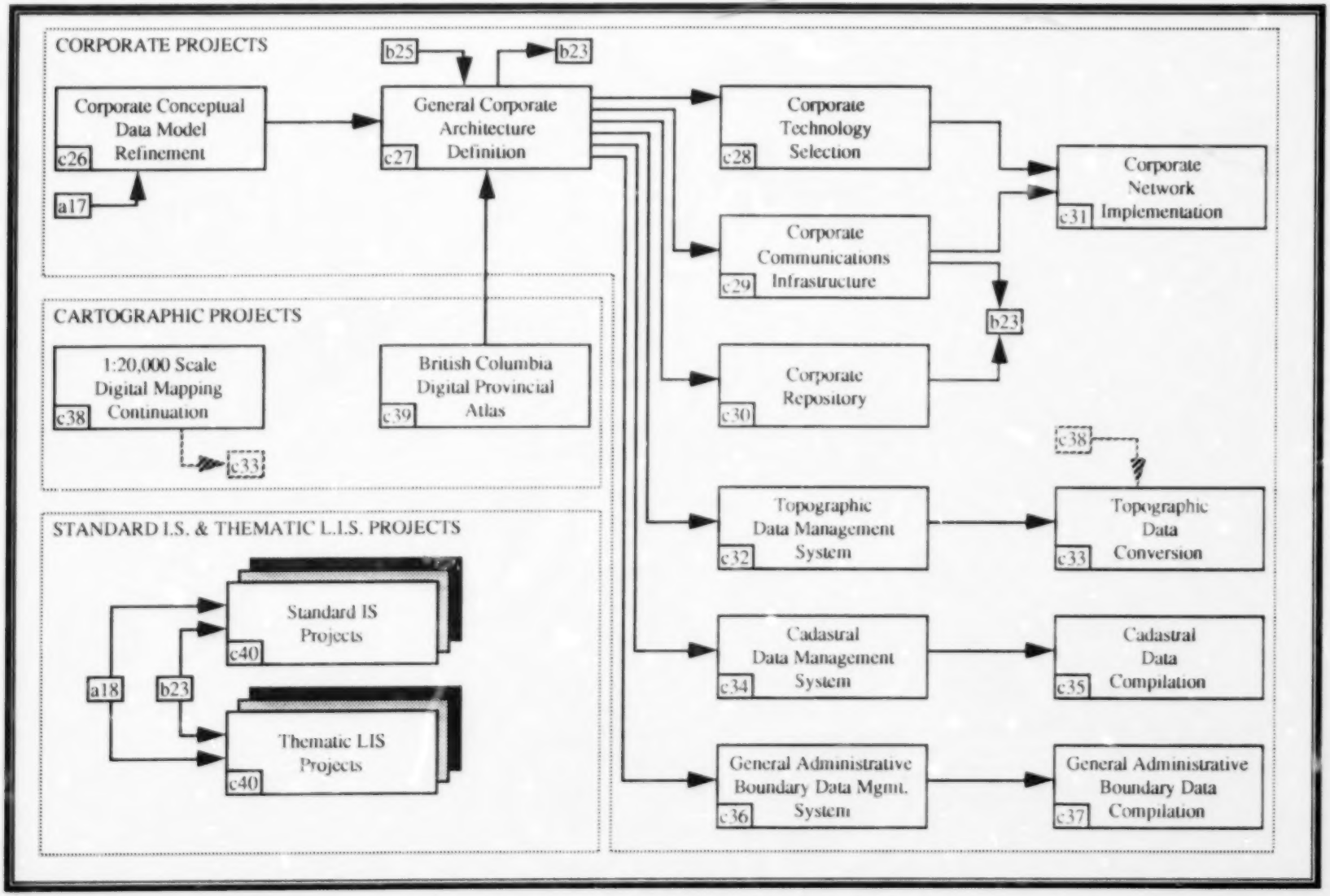
MASTER PROJECT SCHEDULE

Using the precedence network and the resource requirements for each project, a master schedule of all projects described in the action plan has been prepared. The primary intent of the schedule is to provide a consolidated view of the sequencing and rough size of each project. As such, the following should be considered when reviewing the schedule:

- Since most projects will have to be formally initiated and approved, schedule changes are likely.
- The schedule has not been optimized to take into account factors such as balanced use of resources across projects or necessary transition times between projects.

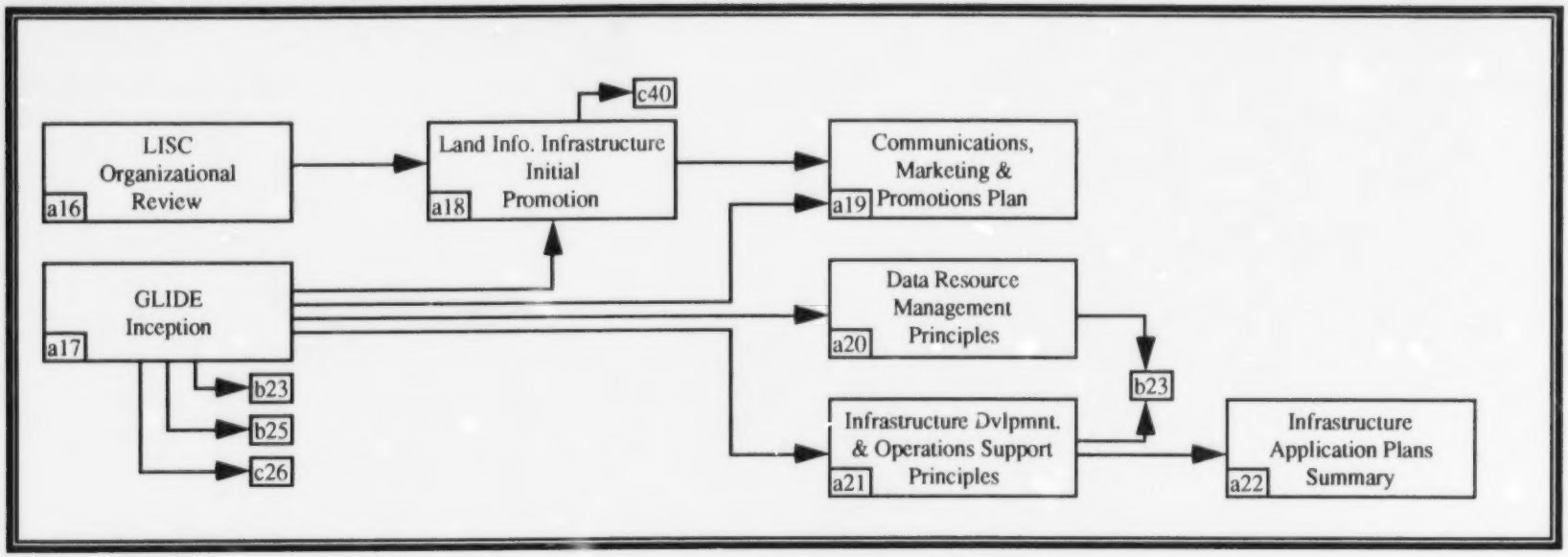
The schedule is presented on the third following page.

LAND INFORMATION INFRASTRUCTURE PROJECTS

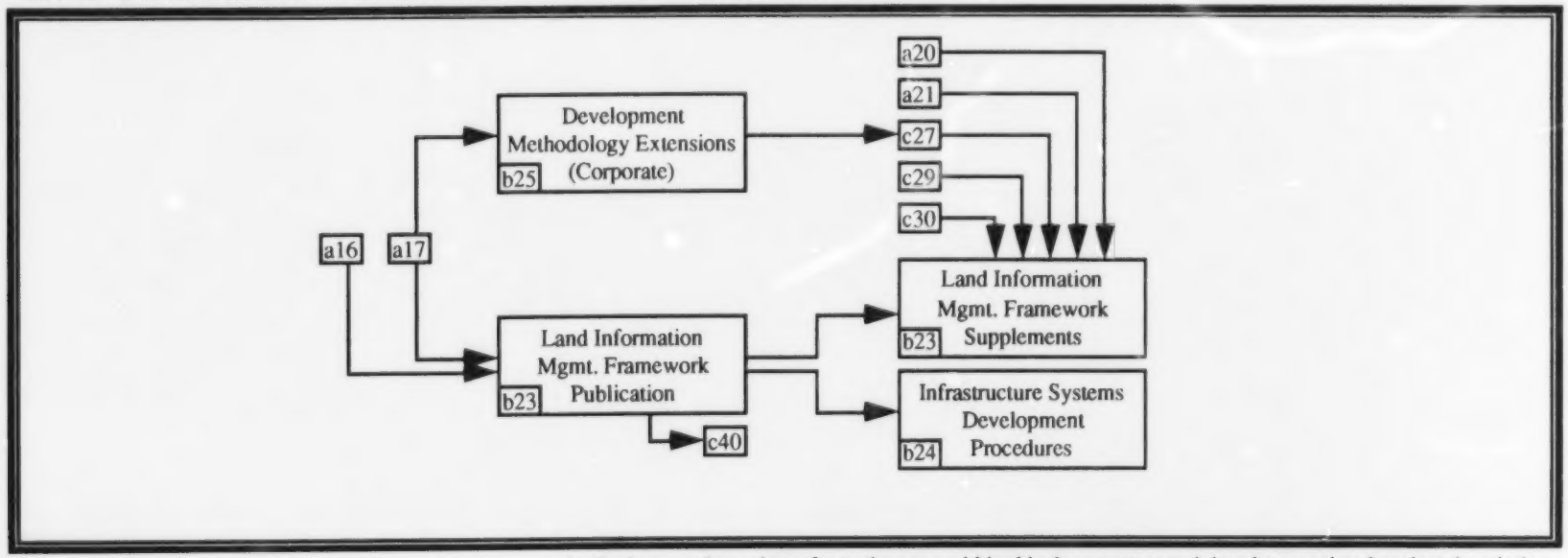


* Project numbers also refer to the page within this document containing the associated project description

ORGANIZATIONAL PROJECTS

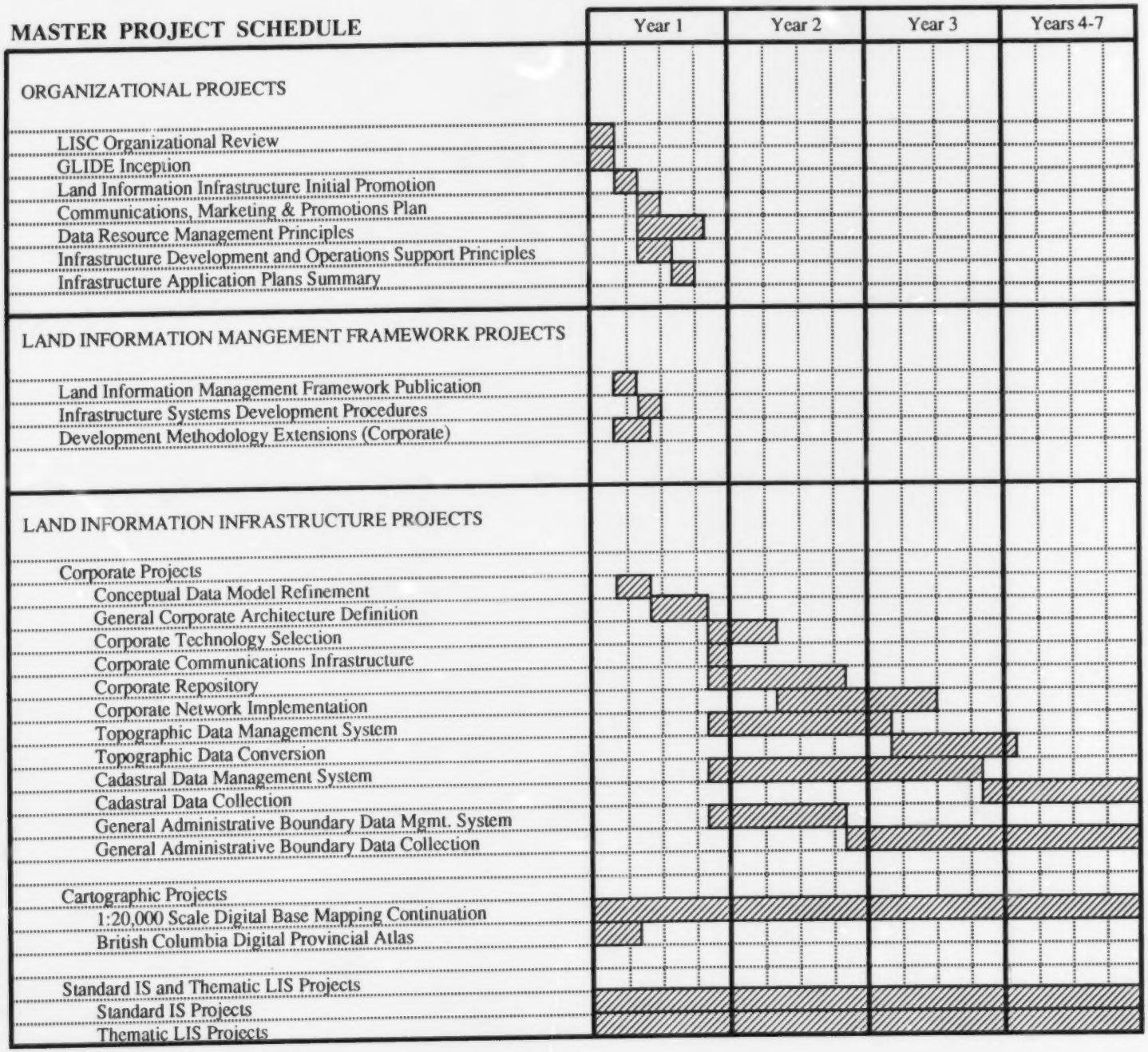


LAND INFORMATION MANAGEMENT FRAMEWORK PROJECTS



* Project numbers also refer to the page within this document containing the associated project description

MASTER PROJECT SCHEDULE



ORGANIZATIONAL PROJECTS

LISC Organizational Review

Description

Using a planning session as a forum, the Land Information Strategic Committee as a whole should realign their organizational structure and responsibilities in light of the organizational recommendations outlined in the Land Information Infrastructure report. This includes striking of the Communications, Marketing and Promotions Subcommittee.

The Office of Information Technology should issue a letter of clarification to LISC recognizing and outlining the distinction and relationship between the two groups.

Deliverables

- Letter from OIT recognizing and clarifying the relationship between LISC and OIT
- Updated version of LISC Organizational Descriptions
- Terms of Reference for the Communications, Marketing and Promotions Subcommittee

Responsibilities

- LISC (execution)
- OIT (support)

Resources

- *Total Effort:* Planning session for LISC
- *Elapsed Time:* Within 2 months
- *Human Resources:* n/a
- *Cost:* n/a

GLIDE Inception

Description

The Government Land Information Data Exchange (GLIDE) group should be established within the Surveys and Resource Mapping Branch, Crown Lands. This includes the publication of a charter outlining the mandate and responsibilities of GLIDE itself and each of its subordinate functional areas:

- Corporate Land Data Resource Management Group
- Communications, Marketing and Promotions Group
- Infrastructure Development and Operations Support Group

The results of the recent Surveys and Resource Mapping Branch Information Systems Plan should be used as a starting point for the definition of GLIDE.

Deliverables

- Placement of GLIDE within the Surveys and Resource Mapping Branch organizational structure
- GLIDE Organizational Charters

Responsibilities

- Director, Surveys and Resource Mapping Branch, Crown Lands
- Corporate GIS/R&D Group, Surveys and Resource Mapping Branch, Crown Lands

Resources

- *Total Effort:* 30 days
- *Elapsed Time:* 2 months
- *Human Resources:* 2 government personnel, part-time
- *Cost:* $10,500 (30 days for 2 gov't resources @ $350/day)

Land Information Infrastructure Initial Promotion

Description

Now that the "Land Information Infrastructure" has been published and approved by LISC, a series of presentations should be arranged for each of the various Ministries and Crown agencies to further explain and promote the concepts, directions and actions arising from the plan. The focus of the sessions should be on initiating activity within the agencies (eg. implementing the necessary Data Administration function). Also there should be a tempering of short term expectations given that concrete services and products will not be provided within the first year of development. Such an orientation suggests that the attendees should be at the director and manager level.

As a precursor to these presentations, a copy of the "Land Information Infrastructure" should be distributed to all organizations that participated in the survey, with an indication of this anticipated follow-up.

The presentations themselves should be about one to two hours in length, with ample time for discussion and commentary.

Deliverables

- Distribution of the "Land Information Infrastructure"
- Infrastructure Presentation Kit
- Presentations to Ministries and Crown Agencies

Responsibilities

- GLIDE Communications, Marketing and Promotions Group (execution)
- LISC Communications, Marketing and Promotions Group (direction)

Resources

- *Total Effort:* 40 days
- *Elapsed Time:* 1-2 months
- *Human Resources:* 2 gov't personnel, close to full-time
- *Cost:* $14,000 (attendees time not included)

Communications, Marketing and Promotions Plan

Description

Once the charter has been established for the Communications, Marketing and Promotions Group of GLIDE, a plan for all actions to be carried out by the group should be developed. The development of this plan should be guided and approved by the corresponding LISC subcommittee.

Deliverables

- Communications, Marketing and Promotions Plan

Responsibilities

- GLIDE Communications, Marketing and Promotions Group (execution)
- LISC Communications, Marketing and Promotions Subcommittee (direction)

Resources

- *Total Effort:* 30 days
- *Elapsed Time:* 2 months
- *Human Resources:* 1 individual (gov't), full-time
- *Cost:* $10,500

Data Resource Management Principles

Description

The first project to be carried out by the GLIDE Data Resource Management Group should be the development and publication of those portions of the Land Information Management Framework dealing with Data Resource Management. This includes the definition of policies, standards, procedures and guidelines in the areas of:

- Data Definition
- Data Inventory
- Data Exchange Specifications
- Data Archival Specifications
- Data Administration

Development and approval of these principles should be supported and directed by the various standards subcommittees of LISC. Involvement by the Data Administration groups of participating organizations will be required, perhaps facilitated through OIT.

Deliverables

- Data Resource Management Supplement to the Land Information Management Framework

Responsibilities

- GLIDE Data Resource Management Group (execution)
- LISC Subcommittees (direction and participation)
- Ministerial Data Administration Groups (participation)
- OIT and Treasury Board (coordination and approval)

Resources

•	*Total Effort:*	90 days	
•	*Elapsed Time:*	6 months	
•	*Human Resources:*	2 personnel (1 gov't, 1 contracted), full-time	
•	*Cost:*	$15,750	45 days for 1 gov't resource @ $350/day
		$22,500	45 days for 1 contracted resource @ $500/day
		$38,250	

Infrastructure Development and Operations Support Principles

Description

The first project to be carried out be the GLIDE Infrastructure Development and Operations Support Group should be the development and publication of those portions of the Land Information Management Framework dealing with:

- Approvals
- Operations
- Security
- Evaluation

Although those portions of the Management Framework dealing with systems development are also within the projected mandate of this group, definition and publication of associated systems development principles have been defined as two additional projects (see "Development Methodology Extensions" and "Infrastructure Systems Development Procedures").

In order to further the concept of the Infrastructure Development and Operations Support Group acting in a consulting and support role to LIS (Land Information System) projects, procedures for the maintenance of a cross-government LIS experience inventory should also be considered within this project. Such an inventory would allow the group to leverage experience resident in other organizations; it would also promote the concept of individual organizations acting in a corporate role.

Deliverables

- Approvals, Operation, Security and Evaluation Supplements to the Land Information Management Framework
- LIS Experience Inventory Maintenance Procedures

Responsibilities

- GLIDE Infrastructure Development and Operations Support Group (execution)
- LISC Coordinating Group, OIT, Treasury Board (direction, coordination and approval)

Resources

- *Total Effort:* 50 days
- *Elapsed Time:* 3 months
- *Human Resources:* 1 individual (gov't), full-time
- *Cost:* $17,500

Infrastructure Application Plans Summary

Description

In order to assist LISC and GLIDE to become proactive groups in the government LIS arena, all planned LIS initiatives within government must be identified. This project is directed at compiling an initial summary of all such initiatives. Given that plans for Corporate and Cartographic projects are already embodied in this report, the bulk of the project effort will be in the identification of Standard IS and Thematic LIS projects. (Note, however, that an initial compilation of LIS project plans has been provided by the Land Information Survey.)

Upon completion of this project, responsibility for maintaining an overall summary of LIS projects should rest with the GLIDE Infrastructure Development and Operations Support Group. The summary should form an ongoing agenda item with LISC.

Deliverables

- Infrastructure Application Plans Summary

Responsibilities

- GLIDE Infrastructure Development and Operations Support Group (execution)
- LISC Coordinating Group (direction)

Resources

- *Total Effort:* 40 days
- *Elapsed Time:* 2 months
- *Human Resources:* 1 individual (gov't), full-time
- *Cost:* $14,000

LAND INFORMATION MANAGEMENT FRAMEWORK PROJECTS

Land Information Management Framework Publication

Description

Using the current British Columbia Government Information Systems Management Framework publication as a base, the Land Information Management Framework should be published as a supporting document. Most of the material necessary for the creation of such a document already exists within the "Land Information Infrastructure"; this project is essentially a consolidation and formalization of the management principles set out in that document. A separate publication will provide a more cohesive framework for the issuance of new policies and standards that are expected throughout the evolution of the Land Information Infrastructure.

Upon completion, the Management Framework will become the responsibility of GLIDE but supported through Treasury Board. Periodic revisions and extensions to the Framework will be necessary as additional policies and standards become apparent from other initiatives. However, additional guiding principles should not be required as these should not change through time.

Deliverables

- Land Information Management Framework
- Periodic Supplements to the Framework (specific supplements are listed under the other projects)

Responsibilities

- GLIDE Data Resource Management Group (execution)
- LISC Coordinating Group (direction)
- OIT and Treasury Board (approval)

Resources

- *Total Effort:* 30 days
- *Elapsed Time:* 2 months
- *Human Resources:* 2 government personnel, part-time
- *Cost:* $10,500

Infrastructure Systems Development Procedures

Description

This project covers the procedures necessary for initiating, specifying, developing and implementing LIS projects within the framework of concepts laid down in the "Land Information Infrastructure". It is intended as a support tool for government Ministries that will allow them to expedite their LIS initiatives.

Deliverables

- Infrastructure Development Procedures Supplement to the Land Information Management Framework

Responsibilities

- GLIDE Infrastructure Development and Operations Support Group (execution)
- LISC Coordinating Group (direction)
- OIT and Treasury Board (approval)

Resources

- *Total Effort:* 30 days
- *Elapsed Time:* 1-2 months
- *Human Resources:* 1 government resource, full-time
- *Cost:* $10,500

Systems Development Methodology Extensions (Corporate)

Description

This project will define specific extensions to the generic systems development life cycle, required in support of the development of Land Information Systems. The focus on "generic" life cycle is in recognition of the fact that each organization may have its own development methodology or some variation on the commonly used British Columbia Systems Corporation development methodology.

The extensions will encompass topics such as:

- Data modeling, definition and specification of land-related data
- Defining and modeling LIS applications
- LIS technology considerations

The methodology extensions will become mandatory for all systems developed in the Corporate domain. Use of the extensions in the other domains will also be encouraged.

Deliverables

- Land Information Systems Development Methodology Guidelines, issued as a supplement to the Land Information Management Framework

Responsibilities

- GLIDE Infrastructure Development and Operations Support Group (execution)
- GLIDE Data Resource Management Group (specialist support)
- LISC Coordinating Group (direction)
- OIT and Treasury Board (approval)

Resources

- *Total Effort:* 100 days
- *Elapsed Time:* 3 months
- *Human Resources:* 1 full-time government resource (50 days)
  3-4 systems development specialists (consultants), part-time
- *Cost:*

$17,500	government resource
$25,000	consulting resources
$42,500	

LAND INFORMATION INFRASTRUCTURE PROJECTS

Corporate Conceptual Data Model Refinement

Description

Using the base data model provided by the previous report, all data within the Corporate domain must be rigorously defined prior to commencing any Corporate projects. That is, the Corporate domain is best characterized as one of data management; common understanding and agreement on its data content is central to the success of all Corporate initiatives.

It must also be recognized that the data model will evolve over time, the role of maintaining the data model will become that of the GLIDE Data Resource Management Group.

Deliverables

- Corporate Conceptual Data Model
  - Data Model Diagrams (that recognize spatial relationships)
  - Corporate Entity Definitions (with essential attributes)
  - Classification of Characteristics (eg. needed scales)

Responsibilities

- GLIDE Data Resource Management Group (execution)
- Ministerial Data Administration Groups (participation)

Resources

- *Total Effort:* 150 days
  - based on an estimate of about 250 data entities,
  - using a metric of 4.5 hours per entity
- *Elapsed Time:* 3 months
- *Human Resources:* 3 contracted resources
- *Cost:* $75,000

General Corporate Architecture Definition

Description

This project puts forward an architecture encompassing all systems to be developed within the Corporate domain. It should be strongly based and driven by the data models provided by the previous project.

Deliverables

- Corporate Systems Architecture
  - Systems Descriptions: A conceptual and high-level functional description of each system within the Corporate domain, directly related to the data models provided by the previous project.
  - Technical Alternatives: A description of the key factors to be considered during the Corporate Technology Selection Project.
  - Corporate Functional Standards: A description of standards to be adopted by all Corporate systems, covering such areas as: user interface standards (dialogs and printed outputs), data storage standards (eg. for retention and update), control standards and common process standards. Some of these standards will be issued as a supplement to the Land Information Management Framework.
  - Cost/Benefit Analysis: Establishing the foreseeable financial consequences of developing and operating all systems within the Corporate domain.
  - Revised Corporate Domain Action Plan: A more detailed action plan should be issued for all systems to be developed within the Corporate domain.

Responsibilities

- GLIDE Infrastructure Development and Operations Support Group (execution)
- LISC Coordination Group (direction and approval)

Resources

- *Total Effort:* 150 days
  - based on an estimate of about 15 systems
  - using a metric of about 10 days per system
- *Elapsed Time:* 5 months
- *Cost:* $75,000
- *Human Resources:* 2 contracted resources

Action Plan

Corporate Technology Selection

Description

This project involves the selection of the technology platform(s) for the Corporate domain. This includes hardware and supporting DBMS/GIS software. The actual project should be executed in five steps:

1. Technology requirements specification, based on the Corporate Systems Architecture
2. Request for information (RFI) process
3. RFI evaluation and product short-list
4. Benchmark process for short-listed products
5. Contracting process

Deliverables

- Report from each of the above steps

Responsibilities

- GLIDE Infrastructure Development and Operations Support Group (execution)
- LISC Coordinating Group (direction)

Resources

- *Total Effort:*

Step 1	40 days
Step 2	20 days
Step 3	55 days
Step 4	60 days
Step 5	20 days
Total	195 days

- *Elapsed Time:* 6-12 months
- *Human Resources:*

Step 1 - 2 Technical Specialists
Step 2 - 2 Technical Specialists plus Procurement assistance
Step 3 - 3 Technical Specialists (5 days each)
3 Functional Analysts (5 days each)
3 Cost Analysts (5 days each)
5 Decision Makers (2 days each - for recommendations)
Step 4 - 2 Technical Specialists plus Functional Analyst support
Step 5 - 1 Contracting Analyst

- *Cost:* $97,500 (Hardware and Software Acquisition not reflected)

Action Plan

Corporate Communications Infrastructure

Description

This project will provide the technical specifications for communications between the Corporate domain and other domains. This encompasses the exchange formats and protocols necessary for inter-system communications.

Deliverables

- Corporate Communications Infrastructure Specifications

Responsibilities

- GLIDE Infrastructure Development and Operations Support Group (execution)
- British Columbia Systems Corporation, Telecommunications Group (support)

Resources

- *Total Effort:* 80 days
- *Elapsed Time:* 2 months
- *Human Resources:* 2 contracted resources (Technical Specialists)
- *Cost:* $40,000

Corporate Repository

Description

One of the central systems within the Corporate domain will be a "repository" of data definitions, data inventories and application inventories. This project is targeted at specifying a detailed functional design of the repository and its subsequent construction.

All estimates for this project are subject to revision upon completion of the Corporate Systems Architecture project.

Note the effort required to populate the repository has not been included, as this cost will become part of the ongoing operational cost of the repository.

Deliverables

- Corporate Repository Functional Design
- Corporate Repository System
- Supplements to the Data Resource Management portions of the Land Information Infrastructure

Responsibilities

- GLIDE Data Resource Management Group (user representation)
- GLIDE Infrastructure Development and Operations Support Group (execution)

Resources

- *Total Effort:* 400 days
- *Elapsed Time:* 12 months
- *Human Resources:* 2-3 contracted resources
- *Cost:* $200,000

Corporate Network Implementation

Description

Once the technology and communications infrastructure for the Corporate domain has been established, the actual installation of the Corporate network can proceed. The implementation has two distinct components:

1. Development of an Implementation Plan

2. The actual installation efforts

Given that this project is highly dependent on prior projects for which requirements have yet to be established, the estimates below only reflect the effort required to develop the implementation plan.

Deliverables

- Corporate Network Implementation Plan

Responsibilities

- GLIDE Infrastructure Development and Operations Support Group (execution)

Resources

- *Total Effort:* 40 days
- *Elapsed Time:* 2 months (plus another year for implementation)
- *Human Resources:* 1 contracted resource (Technical Specialist)
- *Cost:* $20,000

Topographic Data Management System

Description

The Topographic Data Management System will have three main components:

1. Data Loading Subsystem - used for initial creation of Corporate datasets
2. Data Management Subsystem - used for updating Corporate datasets
3. Data Extraction and Transmission Subsystem - used for responding to end-user requests for Corporate data

This project will provide the functional design for the Topographic Data Management System and carry that design through to implementation.

Deliverables

- Functional Design
- Various Manuals
- Operational System

Responsibilities

- GLIDE Infrastructure Development and Operations Support Group

Resources

- *Total Effort:* 700 - 1300 days
- *Elapsed Time:* 16 months
- *Human Resources:* 3 - 7 contracted personnel
- *Cost:*

Hardware:	(based on technology selection project)
Software:	(based on technology selection project)
People:	$350,000 - $650,000

Topographic Data Conversion

Description

This project will translate topographic datasets into a format that can be used for loading the Topographic Data Management System. Since BC-SAIF is expected to be the format that will be used during the loading process, all data within the BC Digital Provincial Atlas will be in a compatible format and not require any conversion. Similarly, it is expected that TRIM products will be provided in BC-SAIF format, starting in the very near future. Thus, the conversion cost is limited to the 1000 or so mapsheets that will have been produced under TRIM prior to the use of BC-SAIF.

Deliverables

- Topographic data in Corporate format

Responsibilities

- GLIDE Infrastructure Development and Operations Support Group

Resources

- *Total Effort:* 700 days
- *Elapsed Time:* 13 months
- *Human Resources:* 2 government personnel, full time
- *Cost:* $500,000 (1000 mapsheets @ $500/mapsheet)

Cadastral Data Management System

Description

The Cadastral Data Management System will fulfill the same functions as the Topographic Data Management System, except on an alternate set of data. In comparison to the Topographic System, the Cadastral System will be more complicated, require more extensive data management, involve a greater number of data sources and require a greater amount of data validation. The amount of stored data, however, will be less than that in the Topographic System.

Deliverables

- Functional Design
- Various Manuals
- Operational System

Responsibilities

- GLIDE Infrastructure Development and Operations Support Group

Resources

- *Total Effort:* 1500 - 2000 days
- *Elapsed Time:* 24 months
- *Human Resources:* 7 - 10 contracted resources
- *Cost:* $750,000 - $1,000,000

Cadastral Data Compilation

Description

This project will deliver cadastral data in Corporate format, for use by the Cadastral Data Management System. A project is currently underway to compile this data at a scale of 1:20,000 covering the entire Province; some adjustments to this current project may be required, pending the results of projects within the Action Plan. However, for the purposes of estimation, current projections have been employed.

Deliverables

- Cadastral data in Corporate format

Responsibilities

- Surveyor General Branch, Crown Lands
- GLIDE Infrastructure Development and Operations Support Group

Resources

- *Elapsed Time:* several years
- *Cost:* $17,500,000 (7000 mapsheets @ $2,500 per mapsheet)

General Administration Boundary Data Management System

Description

This project is similar in intent to the Topographic and Cadastral Data Management Systems. Its focus is on provisioning general administrative boundary data from the Corporate domain.

Deliverables

- Functional Design
- Various Manuals
- Operational System

Responsibilities

- GLIDE Infrastructure Development and Operations Support Group

Resources

- *Total Effort:* 200 - 600 days
- *Elapsed Time:* 12 months
- *Human Resources:* 1 - 3 contracted resources
- *Cost:* $100,000 - $300,000

General Administration Boundary Data Compilation

Description

A project is required to compile all of the general administrative boundaries within the Province and deliver this data in Corporate form. It is anticipated that about 25 or 30 different boundaries are of Corporate interest. Many of these will be detailed boundaries based on the 176 municipalities and regional districts within BC. It is projected that about 5,000 individual boundary occurrences are encompassed within this Corporate need. Although some of this data may already be digitized, it may not be in a form that is compatible with the Corporate domain. As such, it is possible that extensive manual effort may be involved in collecting this data.

Deliverables

- General Administrative Boundary Data in Corporate format

Responsibilities

- Surveyor General Branch, Crown Lands
- GLIDE Infrastructure Development and Operations Support Group

Resources

- *Total Effort:* 5,000 days
- *Elapsed Time:* several years
- *Cost:* $1,750,000 (5,000 occurrences @ 1 day each @ $350 per day)

1:20,000 Scale Digital Base Mapping Continuation

Description

The data currently being collected under the Terrain Resources Information Management (TRIM) program is central to many corporate land-related data needs. Either TRIM must continue, or another program like it must be initiated, to address this common need.

Deliverables

- 1:20,000 scale digital base mapping datasets, covering the Province of B.C.

Responsibilities

- Crown Lands

Resources

- *Elapsed Time:* 7 more years to completion
- *Cost:*

$70,000,000.	from inception
($15,000,000.)	spent to date
$55,000,000.	remaining

British Columbia Digital Provincial Atlas

Description

The B.C. Digital Provincial Atlas project, as described in the previous report, is already underway. It represents an opportunity to address at least a portion of the corporate need for topographic data within a relative short period. The initial phase of the project is directed at providing very small scale (1:2,000,000) and small scale (1:250,000) topographic and baseline thematic data in BC-SAIF format. The data will be provided in both digital and paper forms. Products should be available by the end of 1989.

Much of the above topographic data is currently available in digital form, from federal sources; however, the data do not conform to the required topological structure of BC-SAIF. Thus, the first part of the project, underway now, is investigating automated means for converting existing data to the necessary topological structure. The costs outlined below reflect the anticipated costs for executing the actual conversion, once a conversion mechanism has been provided.

As for the baseline thematic data, additional compilation will be required, including: collection from existing sources, field work, and analysis of satellite imagery. This additional effort is reflected in the cost estimates.

Deliverables

- 1:2,000,000 Topographic Dataset and Mapsheet
- 1:250,000 Topographic Datasets and Mapsheets (84 in total)
- 1:250,000 Baseline Thematic Datasets and Mapsheets (84 in total)

Responsibilities

- Crown Lands

Resources

- *Elapsed Time:* Available by 1989 calendar year-end
- *Human Resources:* (already assigned)
- *Cost:*

Topographic:	$425,000 to $595,000 (85 mapsheets @ $5,000 to $7,000/mapsheet)
BTM:	$2,520,000 (84 mapsheets @ $30,000/mapsheet)
Total:	$2.945,000 to $3,115,000

Standard IS and Thematic LIS Projects

Description

A variety of projects are currently planned or underway that fall within the Standard IS or Thematic LIS domain classifications and that could be considered to be within the scope of Infrastructure.

Such projects should be able to continue without having to wait for the completion of other projects outlined in this document. However, as more of the Infrastructure, Management Framework and supporting functional responsibilities are put in place, Standard IS and Thematic LIS projects falling within the overall concept will begin to leverage the benefits of the corporate approach to land information management.

Deliverables

- Standard IS and Thematic LIS systems

Responsibilities

- Ministries and Crown Agencies
- Support from OIT, LISC and GLIDE

Resources

- (as established for each individual project)